3HT, APRIL 11, 1935 FIRST AERO WEEKLY IN THE WORLD REGD. AT THE G.P.O AS A NEWSPAPER

FLIGHT

The AIRCRAFT ENGINEER AND AIRSHIPS

1372
XXVII

OFFICIAL ORGAN OF THE ROYAL AERO CLUB

SIXPENCE
EVERY THURSDAY

FLIGHT

The AIRCRAFT ENGINEER AND AIRSHIPS

Founded in 1909

FIRST AERONAUTICAL WEEKLY IN THE WORLD

OFFICIAL ORGAN OF THE ROYAL AERO CLUB

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Britain and Germany

THE position of the Government as regards air power was set forth by Sir Philip Sassoon on Wednesday of last week at a meeting organised by the League of Nations Union at the Caxton Hall, London. Sir Philip defended the decision to expand the Royal Air Force on the grounds which various Government speakers have already made familiar. The wisdom of the decision needs no further exposition to the readers of *Flight*, though it was as well for the Under-Secretary for Air to reiterate the reasons for the benefit of the particular audience which he was addressing. Perhaps there was not much hope of convincing that audience that any defence measures are justifiable, just as it may be hopeless to persuade some foreign nations to limit their armaments; but both attempts have had to be made.

In the course of his speech, Sir Philip remarked: "If we were content to stay as we are, we should not long remain in front of Germany." At almost the precisely same moment Sir John Simon, in the House of Commons, reported that in the course of his conversations with Herr Hitler, "the German Chancellor stated in general terms that Germany had reached parity with Great Britain in the air." This does not necessarily imply that the Foreign Secretary had failed to give the news to the Air Ministry, for obviously it would have been improper for the first announcement to be made anywhere but in Parliament. However, the frank acknowledgment of Germany's equality with us has altered the whole situation, more especially as the prospects of the air defence pact proposed by France and Great Britain now seem less hopeful than they were a short time ago.

It must be supposed that Germany now can boast equality with the whole strength of the Royal Air Force, which would mean that she is now far more potent in western Europe than is the United Kingdom. Sir Philip, in his speech at the Caxton Hall, reiterated that Britain is fifth air power, but another speaker pointed out that this figure was arrived at by adding up all the aircraft in the possession of the Royal Air Force, and that when one adds up numbers of aeroplanes one finds that two and two do not make four. The Admiralty has the right to spirit away the Fleet Air Arm, and the War Office may send the five Army co-operation squadrons abroad at its own good pleasure. Only the Home Defence Force ought to be taken into account when British air strength is compared with that of another Power within striking distance. By that reckoning it is probable that Germany is now far more powerful in Europe than is Britain.

A *Flexible Programme*

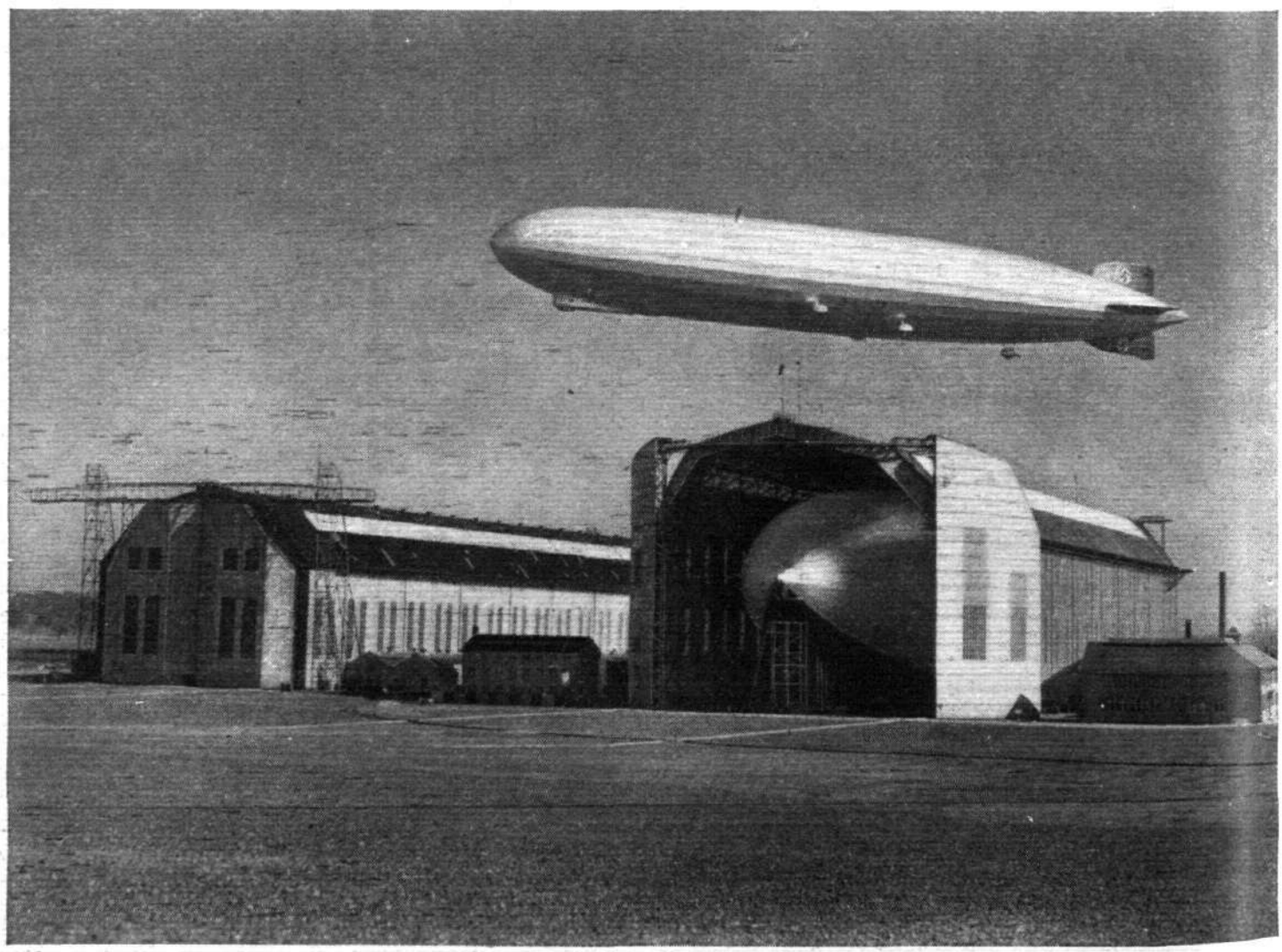
The situation does not become any more assuring when we reflect that it is probably not very long—possibly only a couple of years or less—since Germany decided to violate the Treaty of Versailles and began to build up a flying corps. Since the movement began, the acceleration of production must have been very great, and there is no reason for supposing that the process will not go on in the same way. Comfort, however, may be found in another statement of Sir Philip (repeating what was said before by the Government speakers in Parliament) that our programme for expanding the Royal Air Force is flexible, and can be either retarded or accelerated as the political situation may demand. On hearing of Herr Hitler's admission, one is almost impelled to exclaim that surely the time has now come for its acceleration.

It would, however, be unreasonable to clamour for the Government to order any acceleration until after the meeting of French and British Ministers with Signor Mussolini at Stresa. Though the Duce has issued a warning that miracles must not be expected from that meeting, there are certainly possibilities that the conference will arrive at some understanding which will make the continuance of peace in Europe more probable. Mr. Eden's tour has done much to clarify the situation, and he is reported to have formed the opinion that the danger of a conflagration in Europe

is less imminent than has been imagined. No party in Britain wishes to expand our armaments and perhaps increase the income tax, unless such a step is really necessary for national security.

At the same time, it is extremely comforting to know that the British air programme is capable of acceleration. It may quite justifiably be held that air power depends not so much on the number of existing aircraft as upon the power of rapid expansion in personnel and material. The Reserve of Air Force Officers numbers about 1,250, not all of whom are available for flying duties. Recruitment of sergeant pilots for the Reserve is going on actively, at the same time as recruitment for the regulars is being pushed ahead, and all the flying training schools are busy. As regards the power of accelerating the production of aircraft and engines, it is not possible to speak in detail. The Air Ministry drew up plans some years ago, and obviously it would not be to the public interest to make the details public. In the early part of the great war the Royal Flying Corps was very much hampered by the shortage of British engines, and, in fact, by the shortage of all Allied engines. For a time the R.F.C. was largely dependent on French supplies, and naturally the French flying corps also needed large supplies of engines for itself. In peace time it is a pleasant thought that our leading manufacturers of aero engines receive enough orders to keep their workshops busy, but when war is at the gates one would like to feel assured that their output could be multiplied many times within a very short period. Everyone may certainly feel confident that this vital matter has not been overlooked by the Air Ministry, though the details are not likely to be published.

In all armed forces mobilisation is frequently practised, and warlike operations are rehearsed at manœuvres. Rapid production and issue of new types of aircraft and engines, on the other hand, have not been practised by the Air Ministry since the end of the great war. To get a new type approved for issue has always taken a considerable time, and in that operation anything like undue haste may have disastrous consequences in war. In the last dozen years or so the issue of approved new types to the Royal Air Force has been extremely slow, possibly because of Treasury stipulations, and consequently the Air Ministry is not practised in rapid supply. An acceleration of the R.A.F. expansion programme would have this advantage in addition to others, that it would exercise the Air Ministry in rapid supply of new types to squadrons, and for this reason, if for no other, it would have a value which would justify some extra expense. We must, as was said above, wait until after Stresa, but if that meeting has no definite result, then the question of accelerating the R.A.F. expansion programme ought to be very seriously considered.



BIG—AND BIGGER The keen competition between aeroplane and airship for supremacy on the Atlan ic crossing len s interest to this recent photograph of the *Graf Zeppelin* flying over Friedrichshafen. The new ship, the LZ 129, which is nearly complete, can be seen in her hangar.

The Outlook

A Running Commentary on Air Topics

Overcrowded!

THE great railways must now be filled with jealousy at the plight in which Imperial Airways finds itself. Rush hours excluded, what would any of those railways give to be so overwhelmed with demands for passenger seats that the rolling stock simply would not accommodate everyone, and bookings had to be refused?

Of course, it is a sad business to have to refuse good money, and it is probably a good thing that, judging by external evidence, there are few Scots on the board of Imperials, or the board room might be flooded with bitter, salt tears. Yet it is a solemn fact that the present fleet of flying stock is not adequate to the demands of all the services. On the first flight to Australia on which passengers were to be accepted no one was able to book through from Croydon to Brisbane, because all the seats on the Karachi-Singapore section had been engaged. Then a new fast service with "Diana" class machines (D.H.86's) is being opened, which gets through from Croydon to Brindisi in a day *via* Marseilles, yet home-bound passengers from Australia, India, and South Africa cannot be sure of securing seats on this service, and may have to use the old-fashioned and unpopular train.

Checkmate

A SERVICE twice a week to Marseilles, Rome, and Brindisi is limited in utility, but it serves to mark the newly granted concession to Imperials to use Marseilles as their Mediterranean port. The object of asking for that concession was to start the flying boat service from there instead of from Brindisi, but with the present fleet that is not practicable. When both the African and Eastern services get going full blast, it will be impossible to carry all the passengers for both to the junction at Cairo in one flying boat, and the service will have to be doubled.

The trouble is that until all the Dominion and Colonial Governments concerned have agreed to the Air Ministry proposals for a much accelerated service on both Empire routes, Imperial Airways cannot place orders for a complete new fleet—and new fleets take some time to produce. At the Aero Exhibition in 1929 people gasped at the temerity of ordering a forty-two-seater machine, and yet six years later Imperial Airways finds itself short of seating accommodation. It is all very satisfactory and very sad.

The Autogiro Accident

AFTER considerable delay, the Air Ministry has announced the result of the investigations by the Inspector of Accidents into the accident to an Autogiro at Old Sarum last January, in which the pilot was killed. The Inspector has come to the conclusion that there was no structural failure, and that it is difficult to ascertain with certainty the exact cause of the crash, but that the most likely explanation is that the machine was allowed to get into a high-speed dive in the clouds, and that longitudinal instability then made it uncontrollable. Why the pilot should have allowed the aircraft to get into such a drive is not clear, as his air-speed indicator should have warned him that he was exceeding the safe speed, but it may be taken that the Inspector of Accidents has made certain, as far as possible, that the instrument was functioning during the flight.

It may be recollected that in replying to the discussion on his recent lecture Señor de la Cierva stated that there were indications that in certain conditions the rotor might slow down at very high forward speeds, but that so far as they knew there was no danger in diving. They had under consideration means to limit the speed at which the pilot could possibly dive the machine. It is worth noting that in his report the Inspector of Accidents refers to longitudinal instability, but not to a slowing-down of the rotor. It is not clear whether he and Señor de la Cierva are referring to the same thing. We believe the Cierva Autogiro Company was of the opinion that the pilot must have fainted, but there is no reference to this possibility in the official statement.

The Autogiro was put through its airworthiness tests at Martlesham, and one would have thought that if any tendencies to dangerous diving had existed, they would have been discovered during these tests.

Written Off

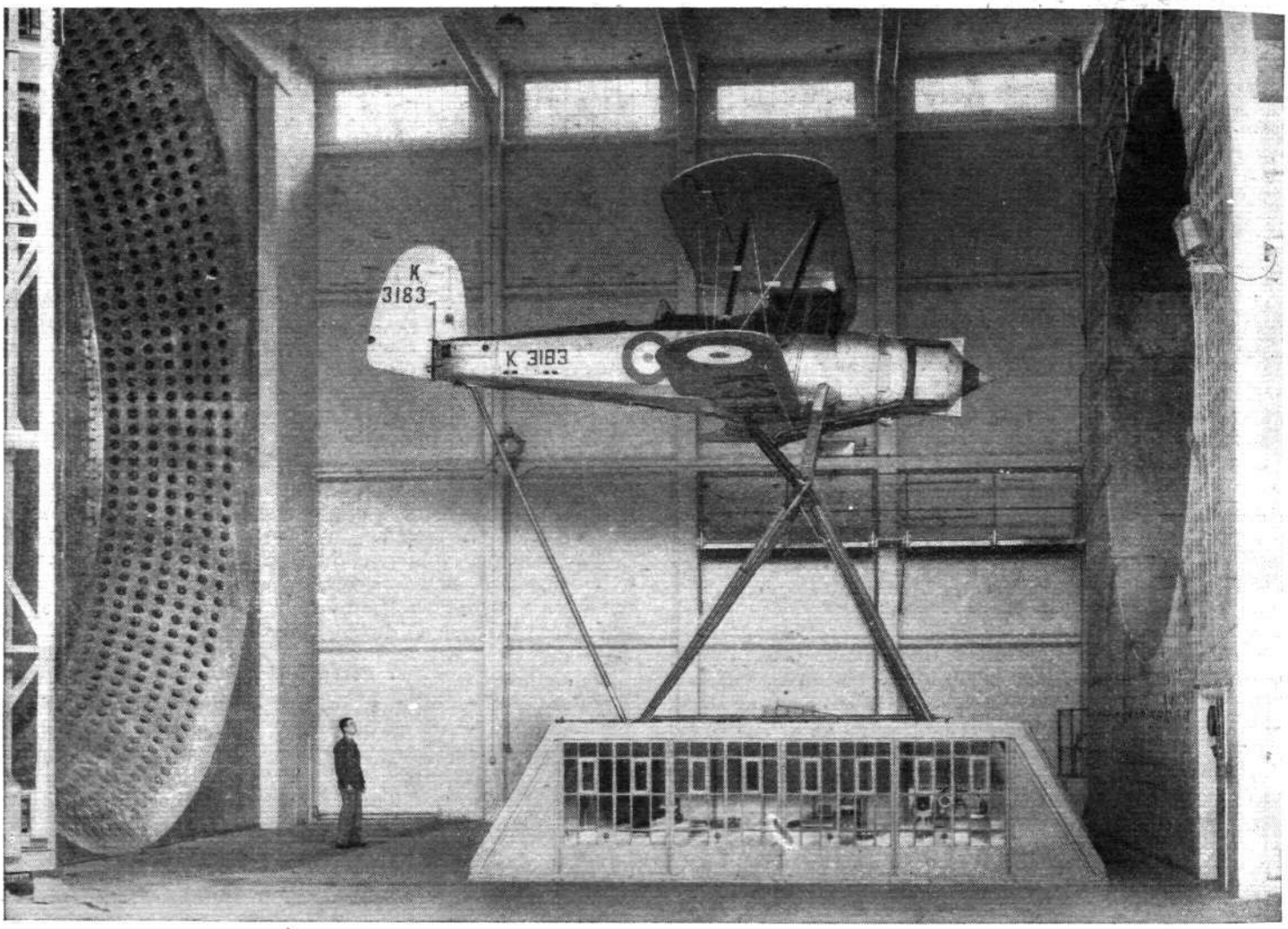
WHEN the pilots of No. 210 (Flying Boat) Squadron were ordered to take four "Singapore III" boats out to Singapore to replace the trusty old "Southamptons" of No. 205 (F.B.) Squadron there, the original idea was that No. 210 should fly the "Southamptons" back to this country. Then the authorities bethought themselves that a flight of this sort costs a lot of money, and that they really would have no use for the "Southamptons" if they got them back. The Home F.B. squadrons are henceforth to fly "Perths," "Singapores," "Scapas," and Saro boats. So the good old "Southamptons" are to be written off charge. This process is sometimes interpreted as "reducing to produce," which ends up with a hacksaw and a roller (as in the case of R.100) or with a can of petrol and a match.

But another possibility occurs to us. Supposing some sportsman in Malaya or the East Indies thought he would like to have a nice old "Southampton" for flying about the Eastern archipelago, and offered to buy one of them, what would the Far East Command do about it? On the staff of that Command there is a Senior Equipment Staff Officer, who is a Wing Commander, no less, and a Squadron Leader in charge of the Stores Section, but would they have the authority and the proper forms in quintuplicate for selling any of the discarded property of His Majesty?

Imperial Airways have sold three old "Hercules" machines to the South African Air Force for use as troop-carriers; but a civil company can dispense with red tape. We can imagine that Wing Commander and Squadron Leader going down promptly with acute malaria if anyone were to want to buy a "Southampton." Let us hope that no such embarrassing offer will be made. The hacksaw and the box of matches are much simpler methods of dealing with "write-offs."

Another Australia Race?

SOUTH AUSTRALIA is to have centenary celebrations next year, and her Premier, Mr. R. L. Butler, is proposing another air race from England to Adelaide, this time for aeroplanes carrying passengers. One would hate to think that South Australia should receive less honour than Victoria just because the latter is two years older, but it is hardly likely that a second race on the same lines as the first could produce anything like the same enthusiasm. If it could produce a passenger-carrying successor to the "Comet," it would, none the less, be worth while. But how would passengers enjoy an experience which C. W. A. Scott summed up in a phrase which will go down in aeronautical history?



Ready for test : A Bristol "Bulldog" with Napier "Rapier" engine on the balance of the 24ft. wind tunnel.
(R.A.F. official photograph, Crown copyright.)

"TEMPLE of the WINDS"

—Lord Londonderry's Name for the New 24 ft. Wind Tunnel at Farnborough : The Tunnel and Its Work

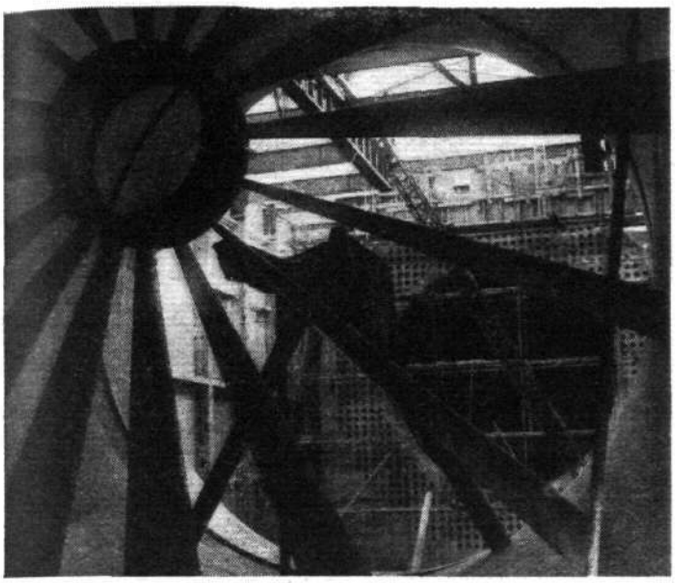
"THE thoughts of science, like those of youth, are long, long thoughts," said the Marquess of Londonderry last Friday, during his speech which preceded the official opening of the new 24ft. wind tunnel at the Royal Aircraft Establishment, South Farnborough.

It was not altogether clear whether the Secretary of State for Air intended this as an apology for, or merely as an explanation of, the fact that the "new" tunnel has been under consideration and construction since 1928. There are those who consider that false economy has been responsible for the relatively modest dimensions of the new tunnel, which in size is very far short of similar tunnels in France and the United States of America. The foreign tunnels are large enough to take a complete aircraft of quite large size, while in that at Farnborough not even a single-seater fighter can be tested complete.

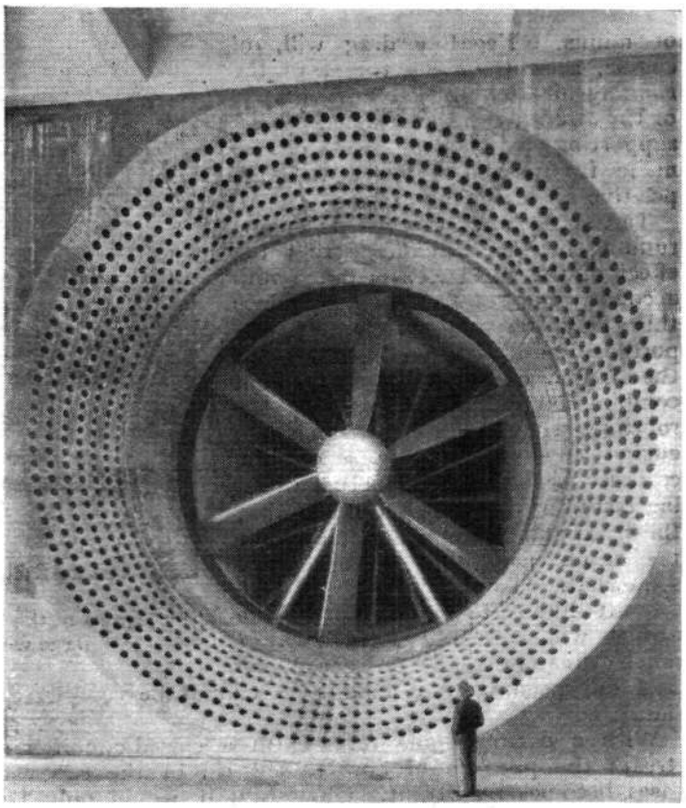
Be that as it may, there is still a great deal of useful work to be done in the 24ft. tunnel. The theory of aerodynamics is now far enough advanced to permit corrections to be made for those portions of the aircraft which project beyond the air stream, and the diameter of jet in which the air is steady—something like 20ft.—will accommodate the fuselage, wing roots and engine nacelles of even a fairly large aircraft. As the tunnel is primarily intended for full-scale research on interference and on engine cooling and engine drag, the consideration shown for the taxpayer's pocket may not result in a serious limitation of utility.

On the day of the official opening of the tunnel by the Secretary of State for Air a Gloster "Gauntlet" with Bristol "Mercury" engine was mounted on the balances of the tunnel. Lord Londonderry said that this "Gauntlet" might be regarded as a challenge thrown down to the problems which it was now hoped to attack, or a challenge by the R.A.F. to the scientific and technical staffs to produce of their best for the Service. In either case, the challenge would be purely a friendly one, as the relations between the operative and the intellective sides of the organisation could not be better. Speaking in the name of the Air Council, he was certain that the leaders of civil aviation and the members of the aircraft industry would associate themselves with the R.A.F. in acknowledging the debt they owed to the professional scientists and technicians, whose work was unspectacular and who might sometimes think that it was tacitly accepted without real appreciation of its value.

Before pressing the button which started the 2,000 h.p. electric motor, Lord Londonderry concluded: "It is now my duty to awaken the imprisoned genius of this place and to start him, and those whom he will serve, upon



A view looking through the radial vanes of the tunnel towards the cradle which supports the 2,000 h.p. electric motor. This photograph was taken while the tunnel was in course of construction. (*Flight* photograph.)



The six-bladed fan which keeps the air moving through the closed circuit at a maximum speed of 115 m.p.h. (R.A.F. official photograph, Crown copyright.)

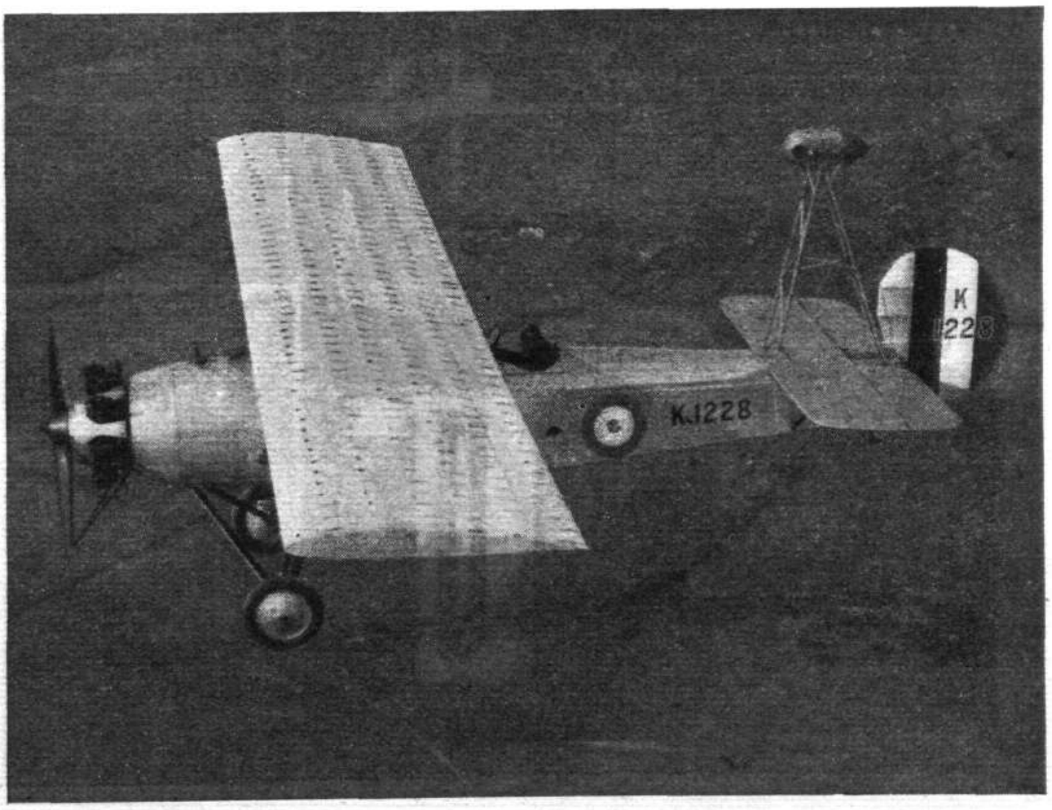
their labours for the benefit of aviation. There is much to be accomplished before he will yield up all his secrets, but yield them he shall, so that we may ride him to our greater safety and advantage outside in the space and freedom of his own element. May good fortune attend, and success reward, the work that is done within these walls."

The new tunnel is of the type known as an open-jet return circuit. A six-bladed fan of 30ft. diameter draws the air from the 24ft. nozzle across the working section and delivers it into a collector, whence it passes through the return passage back to the nozzle. Cascades of vertical guide vanes are used for turning the air stream through 90 deg. at each corner. Behind the fan there is a set of radial vanes, the purpose of which is to take the rotary motion out of the air stream behind the fan.

Housed in a building of steel and ferro-concrete construction, the bell mouth, walls and deflector vanes are finished in cement, and the accuracy attained is a fine tribute to the workmanship of Boulton and Paul, Ltd., who undertook the constructional work. Adjoining the testing section is an erecting shed large enough to prepare simultaneously two aircraft for test, and two cranes placed one at each corner of the opening between shed and testing section permit either aeroplane to be transferred rapidly to the balance which measures the forces on the machine under test.

The actual balance is, of course, located immediately under the jet. It is contained in a compartment partly sunk into the floor and partly projecting above floor level, the upper part being roofed in, with only the five struts which support the aeroplane projecting through the roof. The machine under test is carried by four arms or struts attached to the undercarriage and one secured to the tail skid attachment in the stern.

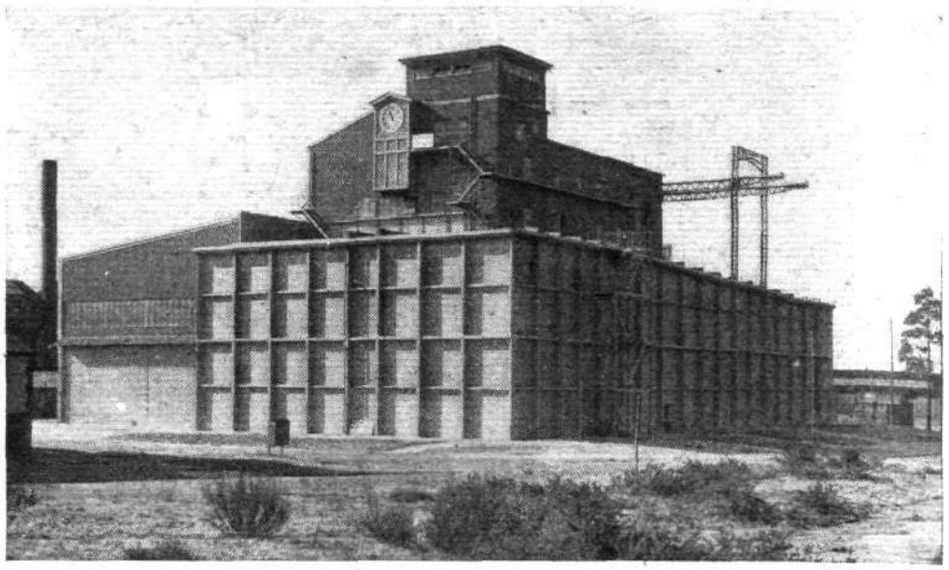
A form of parallel motion linkage is used in the balances, so that simultaneous readings of lift and drag can be obtained. Before a test run is begun the balances are adjusted to zero, that is to say, the weight of the aeroplane and its supports is exactly balanced, so that the forces subsequently measured are pure air forces. The lift balance takes loads up to 8,000 lb., while the drag balance permits of measuring a range of 4,000 lb., 2,000 lb. plus



Studying air flow : The Parnall parasol monoplane used at the Royal Aircraft Establishment for filming, by an automatic camera, the movements of wool tufts on the wing. The actual air forces on the wing are also measured. (*Flight* photograph.)

or minus. Negative drag will, of course, arise from the thrust of the running airscrew only. The attitude of the aircraft can be adjusted by the supporting struts so that tests can be made from small negative to large positive angles of incidence.

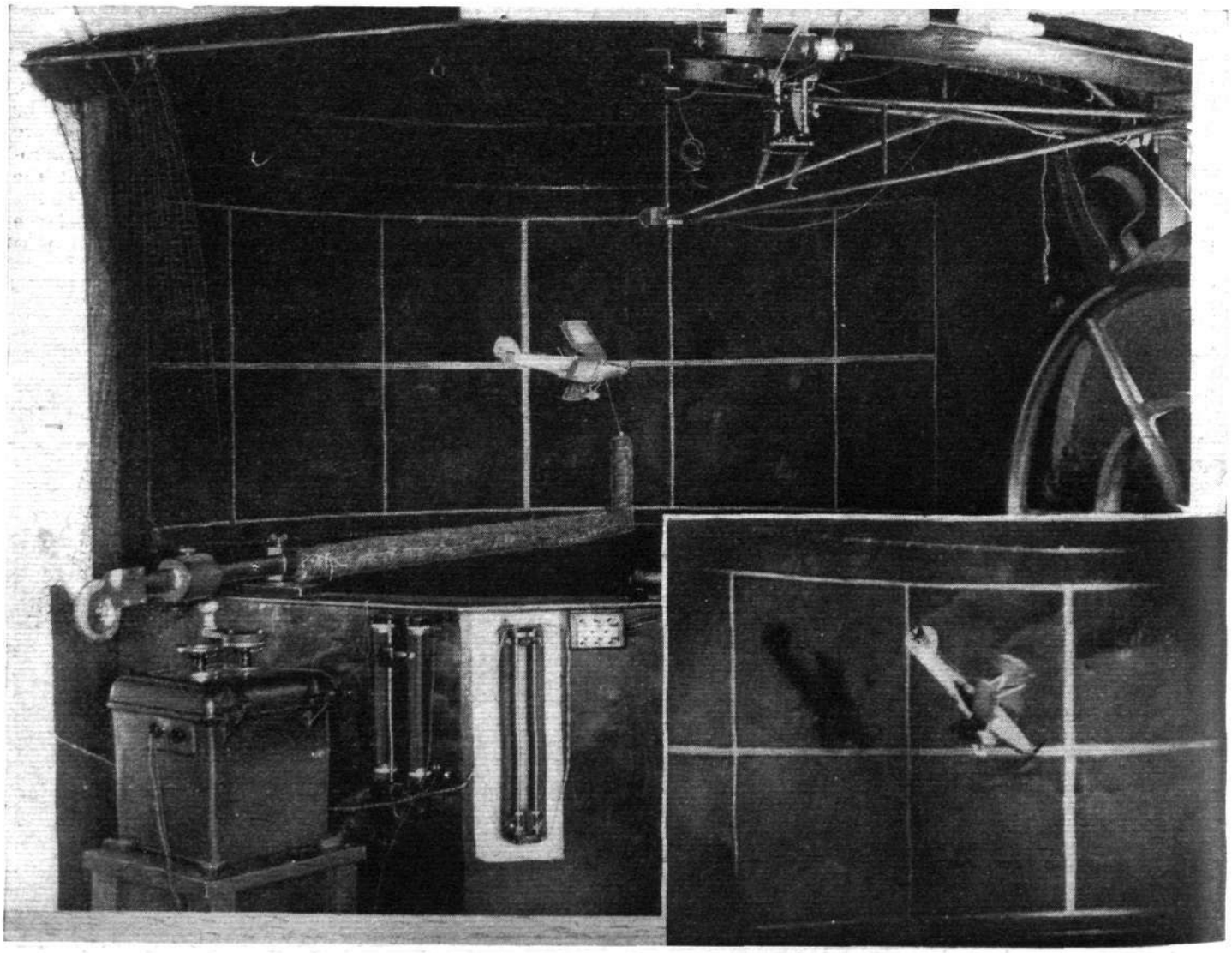
Testing an aircraft with its engine running has the advantage that the effect of the slipstream is taken into account. For research on interference this may be of considerable importance, as it is to be expected that the air flow over a fuselage-wing root combination will be changed by the rotating slipstream. Research on engine cooling and engine cowling can also be made under actual working conditions, although the fact that the maximum speed attainable is but 115 m.p.h. may limit the usefulness somewhat. Almost every full-size aircraft likely to be tested in the tunnel will probably have a very much greater maximum speed, so that full-speed working conditions cannot be completely simulated.



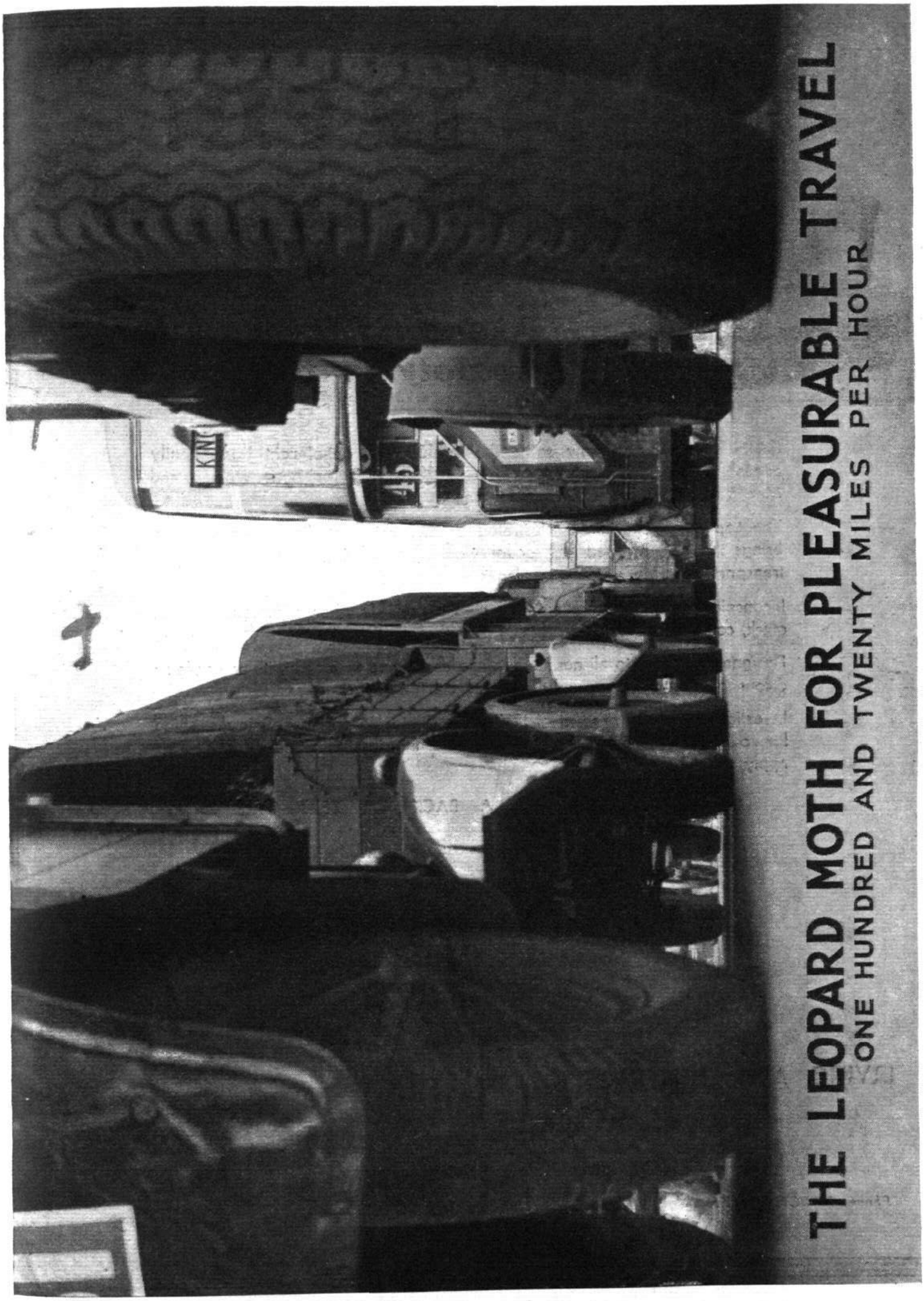
"Temple of the Winds": An exterior view of the building which houses the new large wind tunnel. (R.A.F. official photograph, Crown copyright.)

With a petrol engine running in a closed-circuit air stream the problem of how to get rid of the exhaust gases becomes important. Obviously, it would only be a question of a comparatively short time before the air in the circuit would become dangerous. The trouble has been overcome by a system of controlled leaks in the form of electrically driven fans which remove from the circuit any desired quantity of air in a given time, fresh air being admitted to replace it.

The direct-current B.T.H. motor of 2,000 h.p. which



Spinning tests: In the vertical tunnel at Farnborough balsa wood models are tested for spinning qualities. The larger picture shows a model on the supporting arm, ready to be launched, and the small inset photograph shows a model actually spinning in the vertical air current. (*Flight* photographs.)


THE LEOPARD MOTH FOR PLEASURABLE TRAVEL
ONE HUNDRED AND TWENTY MILES PER HOUR

drives the six-bladed fan is naturally a severe drain on the electricity supply.

The new tunnel is, as already mentioned, intended mainly for full-scale research on the central portions of an aircraft. It is, however, also possible to test in it large-scale complete models. For this purpose a balance car is provided above the jet, from which the models can be lowered into the working section. One such model was exhibited on the day of the official opening. This was a two-fifths scale model of the Parnall parasol monoplane used for measuring directly the forces on a wing in actual flight. In this machine, which was described in *Flight* of April 17, 1931, the wing is carried on a weighing balance which makes possible the taking of direct readings of the air forces on the wing. The same machine is also used for photographing the behaviour of tufts of wool on the upper surface of the wing at angles near the stall, as shown in one of our photographs.

A further aid to research on the behaviour of aircraft is the vertical tunnel, in which small balsa wood models are tested in spinning. The model to be tested is mounted on a swinging arm in a suitable attitude. The electric motor which provides the rising air current is then started and, as soon as the air stream is sufficient to lift the model off its support, the arm is swung out of the way and the model is free to spin. By careful adjustment of the current, the air stream can be kept of just sufficient velocity to keep the model at the right height for observation. By a very simple mechanism—actually, one of those " self-timing " attachments sold for cameras—carried on board the model the controls can be operated to bring the model out of the spin. A piece of white paper is wedged in the hinge of the control surface, and when the control is moved the piece of paper is released. The number of turns made by the model before coming out of the spin can then be counted from the time the piece of paper is seen to fly away from the control surface, which is, of course, the instant of moving the control.

EMPIRE AIR DAY

R.A.F. Stations That Will be Open to the Public

FOR the first time Hendon Aerodrome will be among those opened to the public on Empire Air Day, which this year takes place on Saturday, May 25th. Here are stationed No. 600 City of London, 601 County of London, and 604 County of Middlesex Fighter Squadrons, A.A.F. New Squadrons whose " home life " will be seen by the public for the first time include Nos. 35 and 207 (Bomber) Squadrons at Bircham Newton, No. 15 (Bomber) and 65 (Fighter) at Abingdon and Hornchurch respectively, and No. 33 (Bomber) at Upper Heyford.

As already announced in *Flight*, the Air League of the British Empire, with the active co-operation of the Air Ministry, has arranged for over forty R.A.F. stations to be opened to the public, who will be able to see flying and ground routine as normally carried on. In addition, a large number of civil aerodromes will be open, where " joy-rides " will be available at specially low fees. At both Service and civil aerodromes admission will be at the rate of 1s. for adults, and 3d. for children, and the proceeds will go to the R.A.F. Benevolent Fund. Free car parking facilities will be available.

The full list of R.A.F. Stations—with their Squadrons and equipment—which will be thrown open is as follows:—

England

BEDFORDSHIRE: *Henlow.*—Aircraft depot.

BERKSHIRE: *Abingdon.*—Nos. 15 and 40 Light Bomber Squadrons (" Hart "); Headquarters Central Area, Station Headquarters, Station Flight, and Oxford University Air Squadron.

BUCKINGHAMSHIRE: *Halton.*—School of Technical Training for Aircraft Apprentices, Princess Mary's R.A.F. Hospital and R.A.F. Pathological Laboratory, Post-War Barracks.

CHESHIRE: *Sealand.*—No. 5 Flying Training School (except Packing Depot).

DEVONSHIRE: *Mount Batten.*—Nos. 204 and 209 Flying Boat Squadrons (" Southampton " and " Perth ").

DURHAM: *Usworth.*—Nos. 607 (County of Durham) Bomber Squadron, Auxiliary Air Force (" Wapiti ").

ESSEX: *Hornchurch.*—Nos. 54 and 65 Fighter Squadrons (" Bulldog " and " Demon "). *North Weald.*—Nos. 29 and 56 Fighter Squadrons (" Bulldog ").

GLOUCESTER AND SOMERSET: *Filton (Bristol).*—No. 501 (City of Bristol) Light Bomber Squadron, Special Reserve (" Wallace ").

HAMPSHIRE: *Gosport.*—Coast Defence Training Flight. *Worthy Down.*—Nos. 7 and 58 Heavy Bomber Squadrons (" Virginia "). *Lee-on-Solent.*—School of Naval Co-operation (Seaplane Station). *Calshot.*—No. 201 Flying Boat Squadron (" Southampton ") and Flying Boat Training Squadron (" Cloud ").

KENT: *Biggin Hill.*—Nos. 23 and 32 Fighter Squadrons (" Demon " and "Bulldog") *Eastchurch.*—Armament Training School. *Hawkinge.*—No. 25 Fighter Squadron (" Fury "). *Manston.*—No. 500 (County of Kent) Heavy Bomber Squadron Special Reserve (" Virginia "), School of Technical Training (Men); Station Headquarters, No. 2, Army Co-operation Squadron (" Audax ").

LINCOLNSHIRE: *Digby.*—No. 2 Flying Training School. *Grantham.*—No. 3 Flying Training School. *Waddington.*—No. 503 (County of Lincoln) Heavy Bomber Squadron, Special Reserve (" Hinaidi "). *Cranwell.*—R.A.F. Cadet College and Electrical and Wireless School.

MIDDLESEX: *Hendon.*—No. 600 (City of London), No. 601 (County of London), and No. 604 (County of Middlesex) Fighter Squadrons, A.A.F. (" Hart " and " Wapiti "). *Northolt.*—Nos. 41 and 111 Fighter Squadron (" Bulldog ") and No. 24 Communications Squadron (" Moth," " Osprey " and " Hart ").

NORFOLK: *Bircham Newton.*—Nos. 35 and 207 (Light) Bomber Squadrons (" Gordon ").

NORTHAMPTON: *Wittering.*—Central Flying School.

NOTTINGHAMSHIRE: *Hucknall.*—No. 504 (County of Nottingham) Light Bomber Squadron Special Reserve (" Wallace ").

OXFORDSHIRE: *Upper Heyford.*—Nos. 18, 33 and 57 Light Bomber Squadrons (" Hart "). *Bicester.*—No. 101 Medium Bomber Squadron (" Sidestrand ").

SURREY: *Kenley.*—Nos. 3 and 17 Fighter Squadrons (" Bulldog ").

SUSSEX: *Tangmere.*—Nos. 1 and 43 Fighter Squadrons (" Fury ").

WARWICKSHIRE: *Castle Bromwich.*—No. 605 (County of Warwick) Light Bomber Squadron, A.A.F. (" Wapiti ").

WILTSHIRE: *Boscombe Down.*—Nos. 9 and 10 Heavy Bomber Squadrons (" Virginia and "Heyford"). *Old Sarum.*—No. 16 Army Co-operating Squadron ("Audax") and School of Army Co-operation. *Larkhill.*—Balloon Training Centre. *Netheravon.*—Fleet Air Arm Units and No. 13 Army Co-operating Squadron (" Audax ").

YORKSHIRE: *Thornaby.*—No. 608 (N. Riding) Light Bomber Squadron Auxiliary Air Force (" Wapiti ").

Scotland

FIFE: *Leuchars.*—Training Base for Fleet Air Arm. *Donibristle.*—Torpedo Bomber Training Unit, No. 22 Torpedo Bomber Squadron (" Vildebeest ").

RENFREWSHIRE: *Abbotsinch.*—No. 602 (City of Glasgow) Light Bomber Squadron, Auxiliary Air Force (" Hart ").

MIDLOTHIAN: *Turnhouse.*—No. 603 (City of Edinburgh) Light Bomber Squadron, A.A.F. (" Hart ").

Northern Ireland

Co. ANTRIM: *Aldergrove.*—No. 502 (Ulster) Heavy Bomber Squadron, Special Reserve (" Virginia ").

Apart from aerodromes several factories will be opened to the public. These include the De Havilland works at Hatfield and Stag Lane, Rolls-Royce at Derby, and Saunders-Roe at Cowes. The De Havilland Company will also open its works on Friday to a limited number of visitors; passes will be issued to applicants in rotation.

The R.Ae.S. Garden Party

Arrangements for the Royal Aeronautical Society's garden party promise that there will be an interesting programme. The event, which will be held, by permission of Mr. C. R. Fairey, on the Great West Aerodrome, Heathrow, will begin at 2.30 p.m. on Sunday, May 5th, with a reception by the President and Council.

Among the firms that have promised to send machines are Airspeed, Armstrong, Cierva, Autogiro, De Havilland, Fairey, General Aircraft, Hawker, Aircraft Exchange and Mart (Hendy " Heck "), Percival, Phillips and Powis (Miles " Hawk "), Pobjoy, Railway Air Services, Short Brothers, Spartan, and Vickers, Ltd. Negotiations are in progress for further machines, and it is expected that the " Comet " will fly over, while the Northrop monoplane from the Royal Aircraft Establishment may also appear.

NUTS TO CRACK—No. 4

Here is another " teaser " set by Flt. Lt. Nicholas Comper, A.F.R.Ae.S. Those who admit defeat should turn to p. 390

A SPECIAL charter pilot with a single-engined aircraft was preparing to leave the Isle of Wight for London with two passengers. While proving his engine before the start he noticed that it ran sweetly up to 1,400 r.p.m., but at any revolutions above this figure the engine became very rough.

Ignition trouble being suspected, the magnetos were tested separately, but the roughness persisted. Cylinder compressions, carburation and petrol feed were O.K.

What caused the rough running above 1,400 r.p.m.?

"MACROBERTSON" the MAN

Sir Macpherson Robertson, the Modest Sponsor of the Melbourne Race, Interviewed in London : How the Idea of the Race was Conceived

FROM what has appeared in print, one expected to find a youthful seventy-five-year-old on meeting Sir Macpherson Robertson, sponsor of the England-Australia Air Race; but even so, the appearance of this rosy-cheeked, fit-looking man with a merry twinkle in the eye came as a surprise. He is not by any means a typical Australian. His manner gives no hint of his influential position as one of Australia's greatest manufacturers. . . "So Kingsford Smith said to me, 'Well, look here, Mr. Mac'" . . . and that is how he thinks of himself—as plain "Mr. Mac."

Sir Macpherson Robertson, K.B.E.

As many people know, he built his huge confectionery business from a single-handed venture at toffee manufacture in a back room during his youth. Now his products are eaten all over the Southern hemisphere, and he has branched out in other directions, notably as an air-line operator. His MacRobertson-Miller service now has a five-year main contract between South-western Australia and up through the interior to Darwin. Characteristically, he will not commit himself as to the results. "We've only been working that route a year," he says, "and you can't find out the potentialities of an enterprise in that space of time; it isn't long enough for things to happen."

But to get down to Sir Macpherson's view on the England-Australia Air Race, or, as it is equally well known, "The MacRobertson." Asked when he first conceived the idea, Sir Macpherson said it was about two years ago, when he felt that something big should be done to mark the Melbourne Centenary Celebrations. He proceeded to present to the City a girls' school, a bridge over the river Yarra, a Herbarium for the Botanical Gardens, and—he appears to regard this almost with greater interest and affection—a small fountain near the Shrine of Remembrance.

"Feeling," he said, "that something should be done to make the world in general sit up and take notice of the Centenary, I supplemented these things with the offer of a £10,000 prize, a 650-guinea cup, and gold medals, to be competed for in an England-Australia aeroplane race. Moreover, I felt that something of the sort needed doing to focus interest on the real commercial possibilities of long-distance flying—isolated flights, fine as some of them were, had failed to stir public imagination for long."

Sir Macpherson went on to say that the announcement caused great surprise and speculation, some people apparently thinking the project quite a mad one. He forwarded his proposal to the Royal Aero Club, who received it with enthusiasm and forthwith undertook the organisation of the Race as far as Koepang—"and jolly well they did it."

"I expected twenty or twenty-five entries at the outside," said Sir Macpherson. "When they began to approach eighty I thought, 'Good heavens, what have I done?' I suddenly realised"—this with a merry twinkle in the eye—"what all those gold medals were going to cost me!"

"I am glad beyond words that the Race was such a success, but I have only one regret—that we did not have a top-notch Australian pilot taking part." He then went on to describe his efforts to persuade Sir Charles Kingsford-Smith to fly a British machine. Kingsford-Smith, of course, knowing that there was then no British aircraft of the calibre of the Lockheed "Altair," on which he was making a number of record-breaking flights, felt that he could not do himself justice on anything else. Then, when rumours of the "Comets" reached Australia, Sir Macpherson did all he could to secure him one; but to build an extra machine, over and above the three laid down, was a physical impossibility.

Asked if he had since considered the possibility of another England-Australia Race being held some time in the future, Sir Macpherson said, "Not so far as I am concerned, and I do not think there will be any need for another. I do feel—and I am not ashamed to say that I feel it with great pride—that this one has achieved its object and awakened the world to the possibilities of long-distance commercial flying. Scott's and Black's winning time astonished me, as it did everybody, but I do not think it will be many years before we have mail 'planes putting up an equal average over the route. I am quite convinced that within eighteen months we shall have a five-day mail service, which will be of inestimable value to business people, as well as binding Australia more closely to England in the matter of friendships and affection—in other words, through the medium of personal letters delivered speedily and with replies received equally quickly.

Then, changing the subject, "Mr. Mac" remarked, "You can tell readers of *Flight* that I have not yet had an opportunity of inspecting aviation in this country, though I know that much progress has been made since I was last here, in 1927. But one thing has struck me very forcibly, and it hasn't anything at all to do with flying. I mean the wonderful way in which you're all observing this thirty-mile-an-hour speed limit, and the success of the no-hooting order at night. It's wonderful!"

FRANCE ENCOURAGES THE DIESEL

REGULATIONS have just been issued for the ten-million franc Diesel competition which, as announced in *Flight* last November, is being organised by the French Air Ministry.

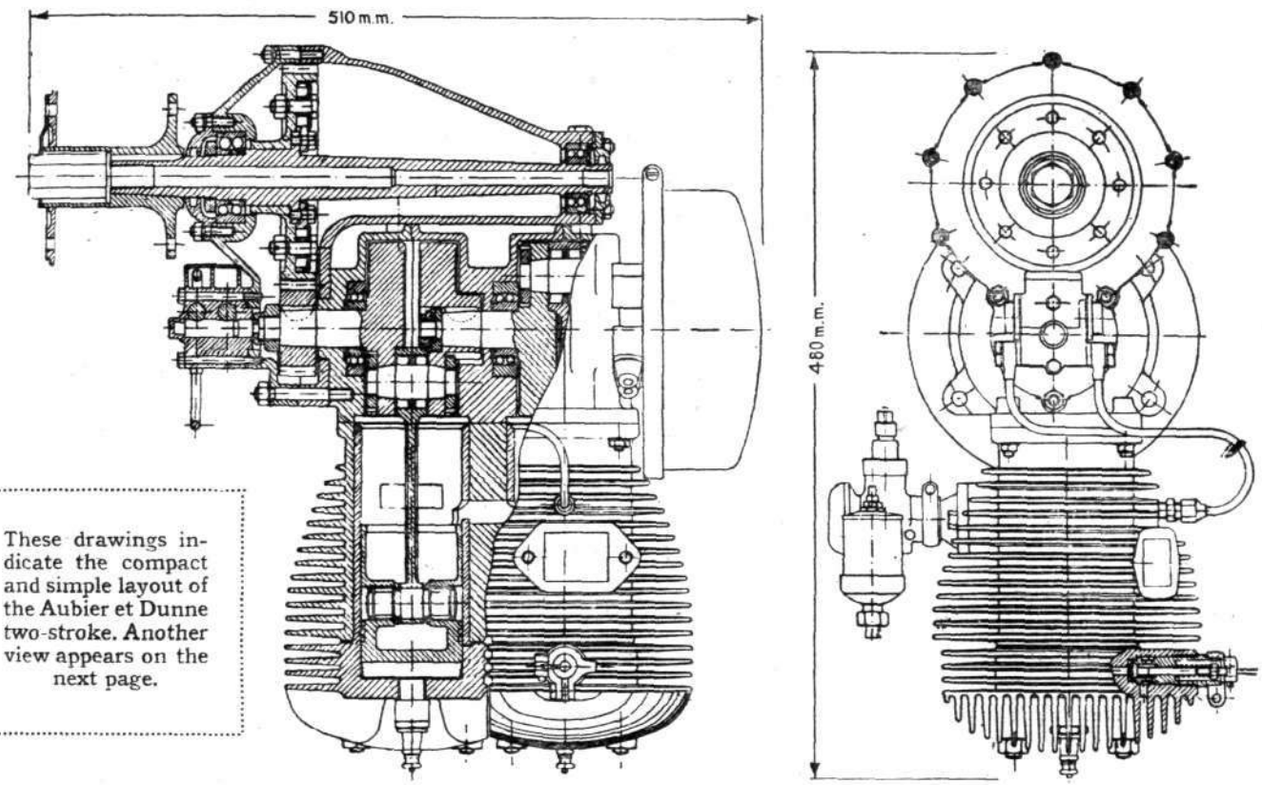
The 10,000,000 franc prize will be awarded to the maker of the first heavy-oil engine of French construction to break the present international continuous flight speed record over a closed circuit of 10,000 kilometres (6,250 miles). The award will also be contingent on an average speed equal to or better than 180 km/hr. (112½ m.p.h.).

If the winning engine shall have been constructed under a foreign licence, even if manufactured in France, the award will be reduced by one half. The French Government, incidentally, reserves the right to enter in this competition one or two engines that may be constructed in its arsenals or shops. If one of these engines should be awarded the prize, the competition will still remain open for private entries, but the amount of the prize will be reduced to 8,000,000 francs.

Technical regulations require, among other things, that the flash-point of the fuel shall exceed 50 deg. C., that the distillation shall be 5 per cent. in volume between 215 deg. and 230 deg. C., have a freezing point below −8 deg. C. and a viscosity of 1.8 or less. The closing date is Dec. 30, 1936.

POWER for the "POU"

Some Interesting Features of the 17 h.p. Aubier et Dunne Two-stroke Unit Fitted to the Mignet "Pou-du-Ciel"



These drawings indicate the compact and simple layout of the Aubier et Dunne two-stroke. Another view appears on the next page.

SINCE its short-lived popularity *circa* 1923, little interest has been taken in the motor-cycle-type engine for light aircraft work, though spasmodic experiments have been made, mainly abroad.

With the advent of the tiny *Pou-du-Ciel*, interest in the truly small and simple engine has been revived. When it is built in Britain this tiny French machine is likely—as announced in *Flight* a fortnight ago—to be fitted with a small water-cooled four-cylinder on light car lines; in France, however, M. Mignet and his disciples are powering their *Pous* with a two-cylinder two-stroke developed for the purpose by the firm of Aubier et Dunne. Though built by a concern which has specialised in small two-stroke engines for motor cycles, the unit in question can hardly be classed in this category, for it has been designed from start to finish for aero work, and it appears to fulfil its purpose satisfactorily.

Of the inverted type, the engine has two air-cooled cylinders cast *en bloc* in aluminium alloy, and provided with steel liners. Six bolts secure the cylinder block to the aluminium crank case. The cylinder heads, also of alloy, are separate, and each is secured by four studs. Operating on the normal three-port two-stroke principle, the cylinders have a bore and stroke of 70 mm. by 70 mm., giving a total capacity of 540 c.c., and 17 h.p. is developed at 4,000 r.p.m., which figure is reduced by gearing to 1,600 r.p.m. at the airscrew shaft. Each cylinder is provided with a compression release valve and a centrally placed sparking plug.

Each piston carries three rings and has the usual two-stroke deflector top. Connecting-rods with double-row roller big-ends transmit power to a 180 deg. crankshaft built up from four parts and running in three double-row ball bearings. The crank-cheeks and bob-weights are, of course, of such a size that they thoroughly "fill" the two compartments of the crank case, thus increasing the compression ratio.

At the rear end of the crankshaft is a special flywheel magneto with windings which give independent ignition for each cylinder, and at the forward end is a duplex plunger-type oil pump, with sight feed, furnishing an oil supply direct to each cylinder wall. Actually this is an auxiliary supply, since the main lubrication system is by petrol, oil being mixed with the fuel in the ratio of 6 to 7 per cent.

A motor-cycle-pattern carburetter, with Bowden-type control, feeds mixture to a short induction passage cast in the cylinder block. Fuel consumption is said to be in the region of 400 grammes (0.9 lb.) per h.p. per hour.

Above the crank case cover is an aluminium housing containing the reduction gearing and carrying the two airscrew-shaft bearings, a two-row ball thrust race in front and a smaller two-row ball race at the rear.

The two gear pinions give a reduction of 2.5 to 1, and an interesting feature of the larger pinion is a shock-absorber, dogs in the outer member transmitting the load to the inner member through the medium of rubber bushes which, incidentally, are carefully insulated from oil. The provision of this *amortisseur* is probably necessitated by the two-stroke engine's well-known tendency to four-stroking, and consequently irregular running, under light load.

Four radially disposed bearer lugs run, fore and aft, the full length of the crank case.

Though the fin area is large, the frontal area of the engine is not excessive for the power; in any case, the point is of small importance in the case of the *Pou*.

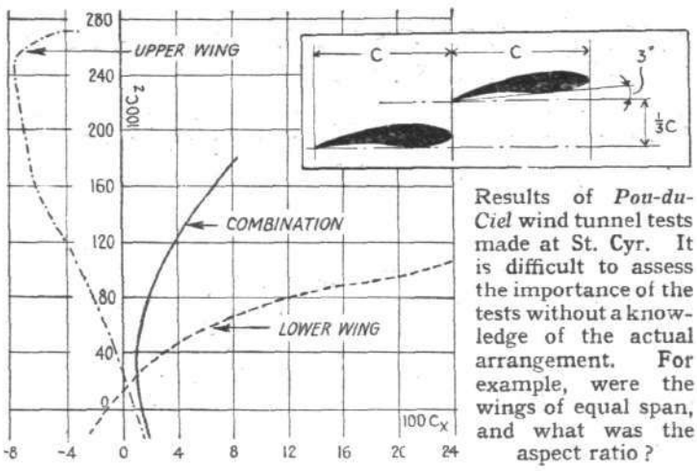
The price of the unit in France is 4,000 francs—£32 at par and approximately £55 at the present rate of exchange.

"POU-DU-CIEL" EXPERIMENTS

M. MIGNET, writing in *Les Ailes* recently, points out that the location of the wing spar in the drawings given in his book may be a little too far back, and recommends constructors of the *Pou-du-Ciel* to shift the spar forward 5 cm. There is room to do this, as the spar does not completely fill the rib depth. The new spar location then becomes 290 mm. from the leading edge. If this is done, and the fore-and-aft position of the hinge line of the front wing is arranged to be 23 cm. in front of the vertical from the centre of gravity, M. Mignet considers that the machine should be perfectly balanced.

* * *

Hitherto one has rather taken it for granted that the wing arrangement used by M. Mignet in his *Pou-du-Ciel* is likely



Results of *Pou-du-Ciel* wind tunnel tests made at St. Cyr. It is difficult to assess the importance of the tests without a knowledge of the actual arrangement. For example, were the wings of equal span, and what was the aspect ratio?

to be somewhat inefficient. That this may not be so is hinted at by M. Maurice Victor, who, writing in *Les Ailes* of April 4, 1935, states that tests carried out at the laboratory at St. Cyr on somewhat similar wing arrangements have, on the contrary, shown the arrangement to be very efficient, the drag being lower, the lift greater, and the L/D ratio greater than the corresponding figures for a monoplane wing. He gives the curves which we reproduce above, but states that he is compelled to observe a certain degree of discretion, as M. Miroslav Nenadovitch will be reading a paper on his results before the Academy of Sciences.

In this connection it is interesting to quote from Report and Memoranda No. 804 of the Aeronautical Research Committee, in which the statement occurs: "It seems to be essential that the front plane shall have a smaller angle of incidence than the rear plane, since consistently inferior results were obtained when this condition was not fulfilled." In the St. Cyr tests the décalage (difference in angle between front and rear wing) was positive, while in the British tests of which results are given in R. and M. No. 804 it was negative.

* * *

The notes below by Mr. W. E. Gray, although extremely interesting in that they draw attention to certain possible shortcomings in the *Pou-du-Ciel*, should not be used as an infallible basis for evaluating the advantages and disadvantages of this interesting design. His models are of necessity very small, and cannot be expected to represent, either dynamically or aerodynamically, the full-size machine with absolute accuracy The method of entering a spin in his small vertical wind tunnel cannot be quite the same as that of the actual machine, and the fact that the model *will* go into a spin might have been foreseen. If the rudder of the actual machine is kept over for an appreciable period after the beginning of a turn, it seems likely that the machine would ultimately get into a spin, or at any rate into an incorrect manœuvre. Presumably the pilot would, in the real aeroplane, start his turn with the rudder, and when the turn was well started he would centre his rudder until the turn was completed, and then stop the turn with "opposite rudder." We do not recall any reference to this in M. Mignet's book, but one would expect this to be the correct procedure. The simultaneous use of the fore-and-aft control which would be made by the pilot cannot be simulated in the model.

Some Spinning Experiments

M. Mignet's attempt to produce a simplified and safer aeroplane for private flying has aroused so much interest (writes Mr. Gray) that some notes on its probable spinning properties may be of use, especially as it may be quite a long time before the slowly-moving research machinery of our country publishes the results of any tests that may be made in the R.A.E. spinning tunnel. So far there have been very few R. and M.s giving the results of free spinning model tests, although the tunnel has been in operation for over three years; it seems a pity if we must go on gaining knowledge by the old-fashioned method of crashing.

Having tested a dynamic model of the *Pou-du-Ciel* in a small vertical spinning tunnel for one's own edification it is perhaps not too rash to make the results known to readers of *Flight*, especially as non-spinning is claimed to be one of M. Mignet's aims. Owing to the very small loading of the *Pou* it is almost impossible to keep the wings light enough even with the lightest-grade Balsa, so two slight departures from complete similarity were made; the wing section had to be much thinner than M. Mignet's, but was of approximately the same centre-line curvature, and the weight of the wings was taken as 105 lb.; to offset this latter the all-up weight was increased to 500 lb., and check tests at 450 lb. and 600 lb. showed no radical change in the machine's properties. The scale was 1/57th, giving a span of four inches and weight of .040 oz., and it is interesting to note that the rudder weight was .0005 oz., or about 6 lb. full scale. The model glides at about 8 ft./sec. minimum.

Both free spinning tests in the tunnel and free flight in still air show that the design is just as fundamentally spinnable as a conventional aeroplane. The rudder is the chief governing factor, and is powerful both in starting and stopping a spin; centralising it stops all spins tested, and alterations of only one degree materially alter some spins.

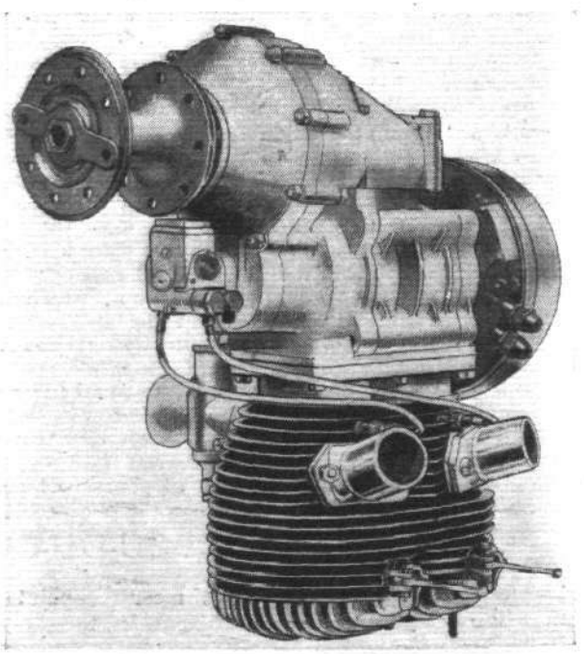
With both chords level the gap was 0.3c. and stagger 1.05c., and the c.g. was 0.4c. below the front wing chord, and tested at 0.3c. and at 0.5c. back from front L.E., these being the practicable limits. With c.g. forward, the wings were given décalages of 3 deg. and 9 deg., but with c.g. back only the 3 deg. case was tried as the front wing was stalling when at 6 deg. greater angle than the rear, and this is outside the proposed range of the machine. M. Mignet's c.g. is at 0.41c.

In all the tunnel spins, which for launching reasons had to be of small radius, the model needed pro-spin rudder of 30-35 deg. and spun with outer wing down 6-13 deg., at fuselage angles of approximately 31-35 deg., and at radii of 1-1.5 ft. full scale—with the exception of the c.g.0.5 décalage 3 deg. case with rudder at 28 deg., when it spins at 3 ft. radius with fuselage at 22 deg., and outer wing down 13 deg. If the rudder angle is reduced somewhat the model comes out with severe outward sideslip.

In the free air spins the rudder angles to give a wide spin were 19 deg. for the c.g.0.3, décalage 3 deg. case, 12 deg. when décalage was increased to 9 deg., and 14 deg. for the c.g.0.5, décalage 3 deg. case. In all three cases 20 deg. rudder produces a 9-inch roll in level flight, in the third case the machine being quite stalled; less rudder gives a wider roll.

If rudder is applied on a glide *and held on* the machine enters a spin, and will go nose-in almost vertically from quite low heights, being worse as the c.g. is moved back, and much worse as the décalage is increased, the three cases varying from 30-70 ft. with 20 deg. rudder, and 50-300 ft. with 10 deg. rudder.

From these results it seems that the pilot will have to be very careful with the rudder, but the movement of the stick is at least instinctive and not reversed as with most aileron controls. With c.g. at 0.3 it seems necessary to reverse the rudder to end a turn, but with c.g. at 0.5 it need only be centralised. Tests with half the dihedral showed a somewhat reduced tendency to enter a spin, and the spins had much more outward sideslip. The longitudinal and directional stability in gliding flight were very marked in all cases. It should perhaps be added that although the wide spin in free air becomes tighter with increased rudder, there seems to be no transition back again in any of the tunnel cases except one



An exterior view of the Aubier et Dunne two-stroke engine made for the *Pou-du-Ciel*, and described on the previous page.

ACTIONS and REACTIONS

Is the Present-day Private Aeroplane Designed by the Expert for the Expert? The Question of Instinctive Control : A Novice Replies to An Expert

THE steadily increasing interest in what may be described as the simplified aeroplane—typified by the *Pou-du-Ciel*—has brought up once again the question of whether present-day design is not influenced too strongly by the attitude of the expert pilot. There is little or no doubt that the machine which is perfect in every way to the experienced mind and hand may seem imperfect and difficult to the novice.

Should it, in fact, be necessary for a novice to learn, slowly and expensively by sheer experience, to operate controls the movement of which only becomes instinctive after this same prolonged training? Is it possible for the pilot with several thousands of hours in his logbook to return easily to his early experiences and to understand the needs of the newcomer?

It was with the object of discovering these needs, by trial and error methods, that a series of short paragraphs, under "The Outlook" heading, have been written. The last of this series, headed "The Essential Rudder," has produced a most instructive letter from a pilot of undeniably long experience. Though perfectly correct and logical in his reasoning and questioning, the writer, Flt. Lt. Christopher Clarkson, views the whole matter from the angle of the expert, whereas we were attempting to lay out the facts from the novice's point of view.

Before proceeding to quote Flt. Lt. Clarkson's letter, it will be advisable to give the gist of the series of paragraphs which preceded it. In the issue of February 28 we explained once again that M. Mignet's tandem wings were claimed to provide a slot effect, and that lateral stability was obtained by using a large dihedral angle and by suitable proportioning of the vertical areas. If a wing drops the rudder is used to right the machine, and the problem, it was suggested, rested on the question of whether or not the rudder brings a wing up quickly enough. If the answer was yes, then it might be possible to do without the ailerons—habitual for the past thirty years.

The Essential Rudder

In the following issue we pointed out that several designers had produced machines on which the fin area was so proportioned that turns could be made without using the rudder, feeling that pupils should be allowed to learn the use of the rudder only after they had become proficient without it.

Finally, in *Flight* of March 21, the suggestion was made that, as the rudder under present conditions is essential, it would be more logical to discard the ailerons—*if it was insisted that simplification was desirable*. By way of showing what could be done with a normal machine—but not, of course, of proving that ailerons were unnecessary in this case—various simple reactions were noted, and the suggestion made that only carefully taught rudder movements would keep a machine on a level keel near the stall. Before, of course, such a method of control can be considered anything but dangerous the whole design would need to be radically altered. The interesting point was that a markedly unsuitable machine *could* be made to provide interesting results.

Flt. Lt. Clarkson's remarks are as follows:—

> I cannot help feeling that the statements made might be most dangerous, either as the basis of a new doctrine or as advice to the *ab initio*.
>
> The actual wording of the paragraph must have left many people in doubt as to the author's intentions, and perhaps he would for a minute go back to the basic principles that govern rudder control, and by this I mean "yaw" control, on an aircraft.
>
> If a little rudder and no bank is applied to an aircraft the nose slews in the direction to which the rudder is applied—i.e., left rudder produces a slew to the left—and, as a result, the outer wing commences to travel faster than the inner wing and in consequence receives more lift. This has the effect of automatically banking the aircraft, and the continued application of the rudder produces further changes which need not be discussed at the moment, but they include a side-slip inwards and the effect of keel surface on the aircraft. Recognising these principles, what does "wing-lifting reactions of 'opposite rudder'" mean, and to what is the rudder opposed?

Stalled Behaviour

> Again, the author says, "But at and near the stall a falling wing came up at once after rudder application." I venture to suggest that this remark can only have been brought about by a misunderstanding of the behaviour of an aircraft when it is completely stalled. No amount of rudder could ever raise a wing when a machine is stalled. All it could do would be to depress very rapidly the opposite wing, giving the impression that the wing that was previously down had come up. Thus, if a left wing is dropped and right rudder is applied, an incipient spin to the left is immediately altered to an incipient spin to the right. This may give the feel that the left wing has come up, but actually the spin is merely transferred from left to right. It should be clearly understood that the above refers to aircraft which are completely stalled, which is the time when the application of rudder is so dangerous. The aerobatic known as a "falling leaf" is a perfect example of this.
>
> The author continues, "Whereas with the instinctive stick movement the machine was merely precipitated into a spin," and the immediate question is, what is the "instinctive stick movement?" The instinctive stick movement must depend on the author's original instruction when he learnt to fly and his ability as a pilot. On certain aircraft the question of aileron drag is a very important one and in the paragraph in question the author seems to be a little uncertain as to the various forces and couples which produce a spin—so much so that I venture to suggest that instead of curing an aircraft from incipient spin the method that he advocates would produce one almost instantaneously.
>
> Please do not think that I am in any way trying to be merely destructive, but this whole question of spinning and its causes is so very important to training that statements such as the above should not go unchallenged. If, on the other hand, I have completely misread the paragraph in question, I apologise to the author, but the wording of it is apt to be ambiguous, and I can only put on it the construction that seems to fit.

Experimental Tactics

After such an interesting and downright series of statements one cannot help feeling a pang of remorse before stating that Flt. Lt. Clarkson *has* misread the paragraph so far as its general sense is concerned. Such tactics were not for a moment suggested as being those which might be followed in the ordinary course of events.

The reason why an application of rudder—in opposition to a wing which has dropped in a normal down-current—is effective at normal speeds was considered too obvious for comment. The course flown by such methods would be nothing if not tortuous for the machine is necessarily turned through a few degrees, but M. Mignet manages to "go places" with his machine just the same! Some machines naturally turn more than others during the process.

Whether one wing is lifted or the other violently depressed by rudder application near the stall appears to be of very little moment. The effect is much the same and height, in any case, is being lost. It is doubtful, too,

whether a machine can be considered to be completely stalled except at one particular moment after the control has been suddenly brought right back. In the ordinary way an average machine is surely only partially or occasionally stalled, even with the stick well back, and training machines can usually, by quick and delicate work with the rudder, be "held out of a spin" without results as violent as those in the falling-leaf manœuvre. Machines differ, of course, according to their rigging, and the writer has had experience of one training machine which before its C. of A. could only with the greatest difficulty be made to do anything more than a stalled turn, yet which afterwards spun with most entertaining viciousness.

Surely a movement is still instinctive even after training has caused a pilot to repress such an instinct? If one's right wing drops the instinctive movement is to try to lift it with the obvious means at hand. The properly trained pilot eases the column forward, and uses a little opposite rudder, but such actions can hardly be considered to be instinctive to anyone but the most able pilot.

The point seems to be that originally instinctive reactions may be very different from any which *become* instinctive by virtue of training and long experience. Eventually it would be possible, for instance, to learn to ride a bicycle in which the handlebars had to be moved in the reverse direction to normal at speeds below five miles an hour—but this is no good reason for so manufacturing all velocipedes! The novice—who may have been flying for a considerable time without really leaving this category—is, after all, the person who should be studied first where the private owner type is being considered.

Meanwhile, *Flight* would welcome the views of both expert and novice (one apologises for this misused word!) on the several interesting points raised. H. A. T.

THE LATEST SOVIET BALLOON

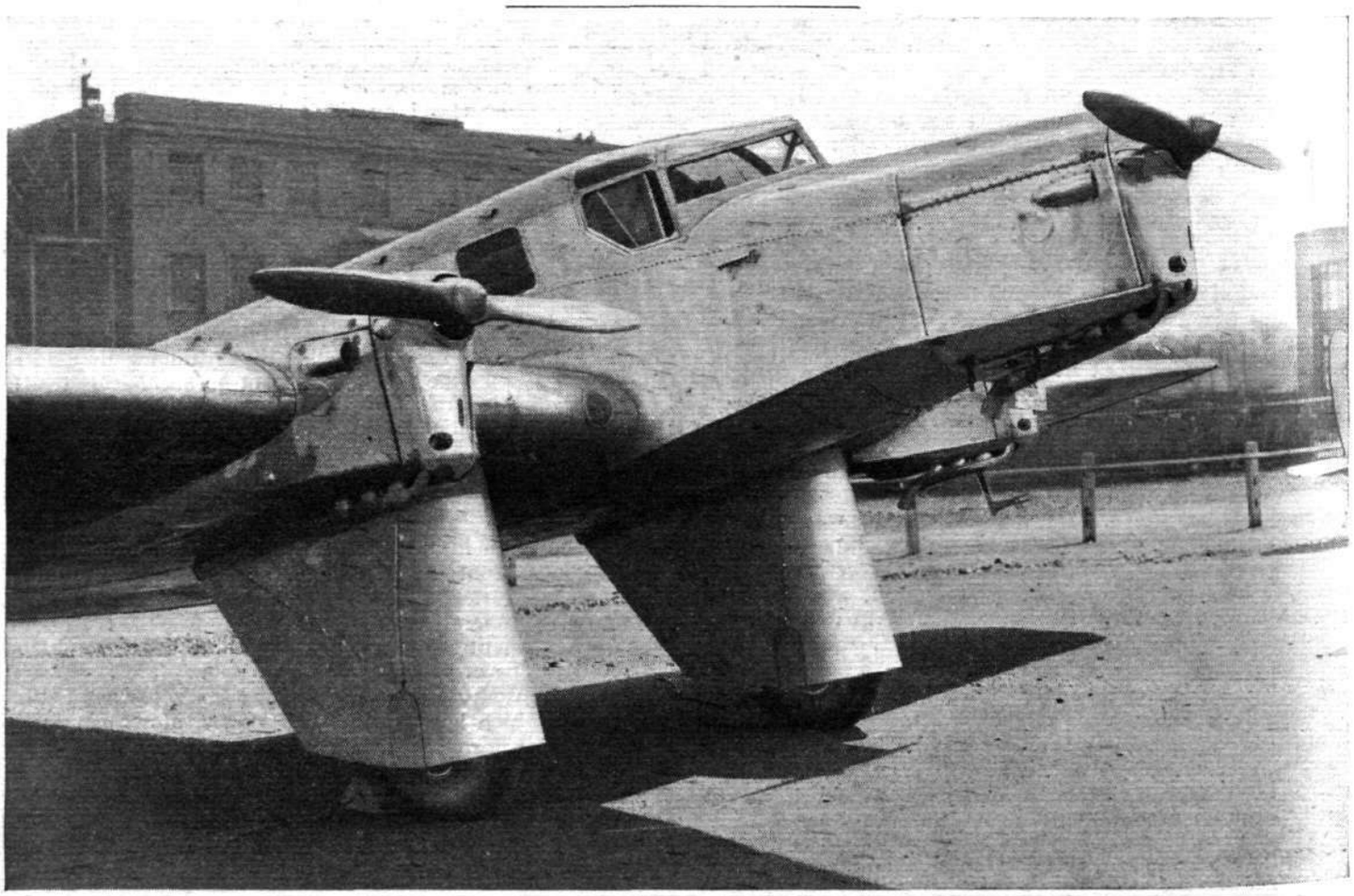
THE new Soviet "stratostat," or high-altitude balloon, the *Osoaviakhim II*, is due to make its flight into the stratosphere this year. The design contains a number of innovations, as compared with the *Osoaviakhim I*, which should enable it to attain a higher altitude and to provide greater safety for its crew.

The envelope, which will be considerably larger than that of its predecessor, will be made of a new type of rubberised cambric muslin. On the upper hemisphere, from which the gondola is suspended, special reinforced fabric is to be used.

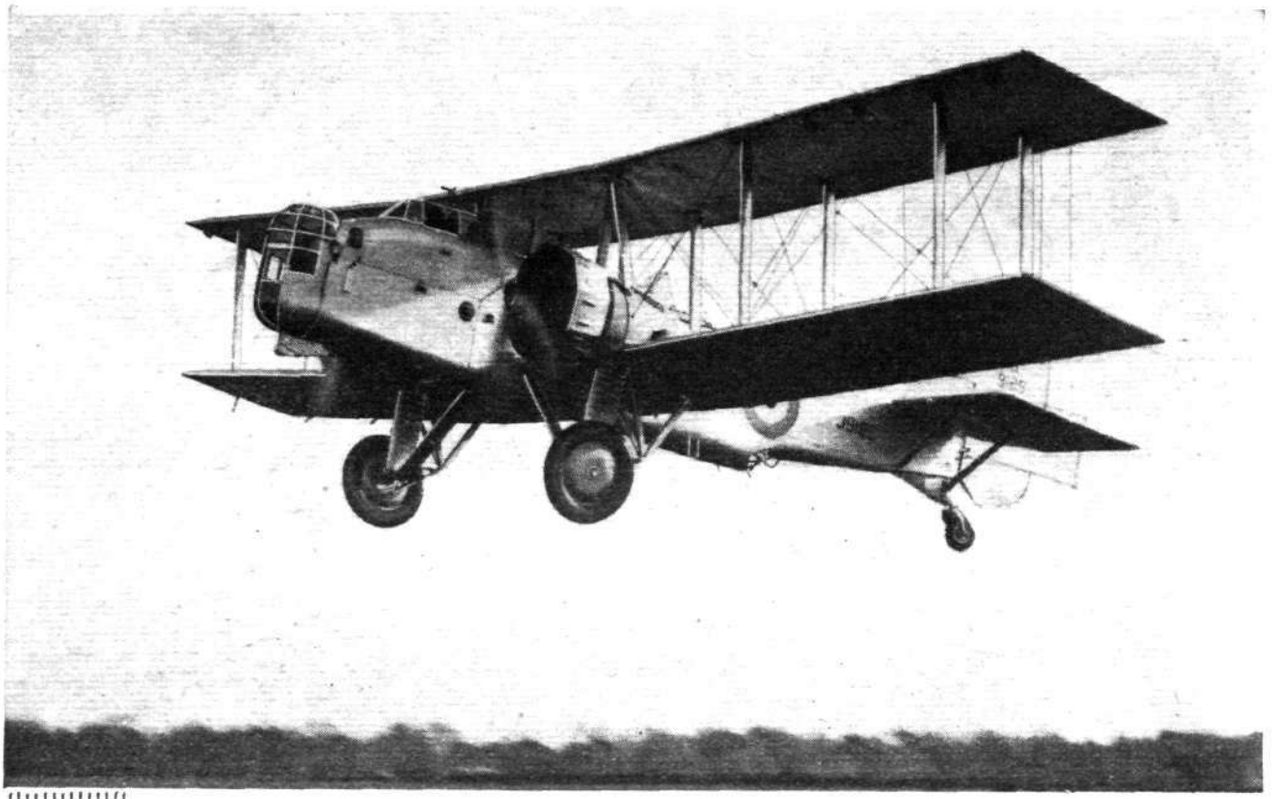
The gondola is being constructed of stainless steel and will be of all-welded construction. The upper part will contain two glass covered windows, which will be hermetically sealed during flight, but which will permit observations. In case of an emergency both windows can be opened in five or six seconds. The gondola will be hung from twenty-four ropes, which are being designed by the engineering staff of the Kanat and Neva rope and cable manufacturing plants in Leningrad.

The instruments have been designed to work automatically as far as possible, in order to free the attention of the crew for observations. A special barograph and apparatus for taking samples of the air for subsequent analysis are being prepared by Professors Verigo and Tverskoi, of the Central Geophysical Observatory, while the Pulkovo Observatory is making a special spectograph. Doctors from the Military Medical Academy in Leningrad are designing oxygen apparatus for the crew. Special ventilators, altigraphs, thermographs, photographic cameras and other apparatus are also in process of construction.

Great attention has also been paid to making the *Osoaviakhim II* perfectly safe in flight. The gondola will have an automatically opening parachute, which will provide a safe descent in case the gondola should become detached from the gas bag.



A NEW VERSION. This new model of the Spartan "Cruiser" (three Gipsy "Majors") has a cantilever undercarriage with "full-cut trousers." The front part of the fuselage is still built-up, boat-fashion, of light alloy, but the rear part is now a welded steel-tube structure with doped fabric covering. The machine, which was one of the exhibits at last Saturday's Egyptian Mission visit to Croydon, is being used by Spartan Air Lines between London and Isle of Wight. (*Flight* photograph.)



The Boulton Paul "Overstrand"

ARMAMENT OFFICERS' BOMBING TROPHY.

This Trophy for Day Bomber Squadrons for Bombing Results obtained during 1934 has been awarded to No. 101 (B) Squadron.

★ *No. 101 (B) Squadron is equipped with Boulton Paul Twin-Engined Bomber Aircraft.*

BOULTON PAUL AIRCRAFT LTD.
NORWICH • ENGLAND

THE FOUR WINDS

ITEMS OF INTEREST FROM ALL QUARTERS

A Hyde Park Show?

A scheme, it is reported, is under consideration for the organisation of a Jubilee pageant representing the progress of aviation from 1910 to the present day. The scene will possibly be Hyde Park.

Her Grace Proceeds

The Duchess of Bedford, who is making an African tour, arrived at Khartum on Saturday. She intended to leave on Monday for Cairo.

Illuminated Jubilation

A "fly past" of illuminated Service machines from Worthy Down during a torchlight procession will be a feature of Winchester's Jubilee celebrations.

Leading the Way

Sir Philip Sassoon, Under-Secretary for Air, has made a donation, sufficient to provide a flying scholarship, to the Young Pilots' Fund of the Air League of the British Empire.

An Arboreal Alighting

Disentangling himself from shroud lines and branches, Mr. C. L. Harris climbed unhurt from a tree in which he had landed from a parachute drop. He was giving a display at Denbury, the new Devon aerodrome.

Pole Jumping at Cannes

One of the founders of Cannes airport claimed that the municipality, which took over the airport in 1931, owed him £18,000. Obtaining no satisfaction, he erected an array of sixty-foot poles on land adjacent to the airport. But Governmental sanction was secured for the removal of the gentleman's handiwork, and the airport of Cannes is once more in commission.

PHOTOGRAPHING THE LANDING SPEED. The Boeing Company determines the landing speeds of its aircraft through the means of a film camera, a large wire grid, and an anemometer. The pictures taken show the forward travel of the machine and the gliding angle, and, by plotting the line of flight across the grid screen and by allowing for ground wind as measured on the anemometer, an accurate calculation of the speeds is obtained.

Austria's Revivalist Meeting

During a parade of the entire military garrison in the grounds of the Imperial Palace of the Hapsburgs, Vienna—the first since the war—fifteen military aeroplanes circled overhead. The possession of military aircraft is forbidden to Austria by the Treaty of St. Germain.

NEARER STILL: This Pitcairn Autogiro, ordered by the U.S. Bureau of Air Commerce, has a Pobjoy engine. The Bureau of Air Commerce, it will be remembered, has been studiously fostering the fool-proof private owner type of machine.

The Family Fastness

One clause of a Bill passed through the Czech parliament compels all contractors building new houses to provide bomb-proof shelters in the cellars.

Meanwhile—

In a lecture to members of the medical profession in London, Major H. S. Blackmore, R.A.M.C., said "The safest shelter in the event of an air raid is an ordinary room, rendered gasproof, on or about the first floor."

Demonstrative

Contending that they had been accorded insufficient representation, some of the tribes along the banks of the Euphrates recently protested by forcible demonstration. To remind them of the power of the Government, seventeen machines of the Iraq Flying Corps flew over the affected area.

The First Wright Biplane

It is probable that the original Wright biplane, on which the Wright brothers made their first flights at Kitty Hawk in 1903, and which has been one of the principal exhibits at the Science Museum, South Kensington, when it was on loan for a period of eight years, will soon have to go back to its native land. The technical data centre which is being formed at Kitty Hawk is to be opened early next year, and a place has been allocated for the famous biplane.

AIRCRAFT in WAR and PEACE

Discussion by League of Nations Union : The Government's Policy

A USEFUL conference to clarify for public information the various aspects of aircraft as affecting the international situation was organised by the League of Nations Union at the Caxton Hall, London, on April 3. Lord Cecil was in the chair, and the first speaker was Sir Philip Sassoon. Explaining the Government's policy, he said it remained, in Mr. Baldwin's words, one of international disarmament. He repeated the reasons given in Parliament for the decision to increase the Royal Air Force, summing them up as "our commitments under the Covenant of the League and the Locarno Treaty, the many symptoms of unrest in Europe and elsewhere, and the failure of other Governments to follow our example by comparable reductions." The expansion, he said, was not provccative, and was not thought to be provocative by other Powers. Our rate of increase was not a very rapid one; it could be held up at any stage, or it could be accelerated should that become necessary. If Britain were to be a useful participator in the proposed Air Pact it must be strong enough to offer adequate assistance when called upon. Once a policy of mutual assistance based upon an equality of air strength was firmly established, the chief obstacle to a general reduction of air armaments would have been removed

Turning to the proposal that the League of Nations should be armed with an international air force, Sir Philip said that analogy with the police of a nation was dangerous. One could not hope for similar results among independent nations unless a mutual danger forced them to set aside their individual differences and combine for mutual protection. "The Air Pact is based on the germ of that idea. The germ may grow and become a tree; but the League of Nations is not based upon it." None of the proposals for a League air force had produced any solution of the difficulties of location, recruitment, administration, financing, and control and operation in the event of the exercise of force. The maintenance of an armed force by the League would be incompatible with its constitution and principles. Even if Britain were to accept such a change, the Dominions would reject it.

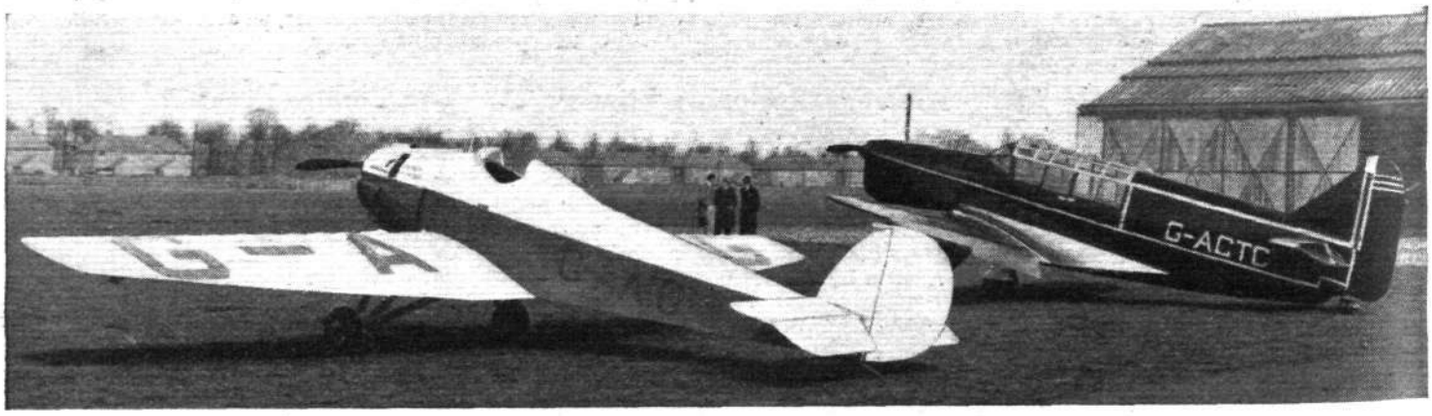
He turned to suggestions for abolishing air bombing and military aircraft, and said that it would be impossible to prevent a belligerent nation from using for bombing purposes military or (in the absence of these) civil machines. A more hopeful line of approach was the devising of some reasonable scheme which the opinion of the civilised world would sanction for the restriction of air bombardment to certain defined military objectives. There was a danger in pursuing proposals which were illusory; a surer road was to seek to remove the causes of war by removing the feeling of insecurity which now pervaded so many nations.

Another Member of Parliament who spoke was Lieut. Col. Moore-Brabazon, who said that there were three broad avenues of attack, first the provision by nations of fighter aeroplanes of such high performance as to be able to deal effectively with converted civil machines used for war purposes; secondly, the provision of commercial air lines which should aim at being purely paying propositions; and thirdly, the provision of cheap "fly-abouts" for private persons, which should be the basis of the real aircraft industry.

"Nuts to Crack" Solution

Airscrews running at high r.p.m. can be very inefficient at slow flying speeds. In this instance the aeroplane itself had a stalling speed below 30 miles per hour, and near to this speed the airscrew merely "cut a hole in the air" without developing any appreciable thrust.

A HANWORTH DEMONSTRATION



The "Hobo" and the "Heck."

BOTH the Hendy Aircraft Co.'s "Heck" (Gipsy "Six") and "Hobo" (Pobjoy) were dealt with fully in *Flight* when they made their first flights. Since that time the "Heck" has been cleaned up even more, and the speed range is now from 182 m.p.h. to 40 m.p.h., a truly remarkable achievement on the part of the machine's designer, Mr. B. B. Henderson.

A demonstration of these two aeroplanes was held by the Aircraft Exchange and Mart, Ltd., who are the sole concessionaires, at Hanworth last Monday; Lord Patrick Crichton Stuart owns the "Hobo" and Mr. Whitney Straight the "Heck." The latter planned to leave for Milan in his machine last Wednesday. The top photograph, taken by our photographer at Hanworth Park, shows the "Hobo" on the left and the "Heck" on the right. In the group, Lt. Col. F. C. Shelmerdine is seen on the right, Mr. B. Brady, of the Aircraft Exchange and Mart is in the centre, and Mr. B. B. Henderson on the left. Col Shelmerdine, as Director General of Civil Aviation, follows the development of light aeroplanes very keenly and is often to be seen at flying demonstrations of this nature.

Mr. B. B. Henderson, Mr. B. Brady, and Lt. Col. F. C. Shelmerdine.

THE ROYAL AIR FORCE

SERVICE NOTES AND NEWS — AIR MINISTRY ANNOUNCEMENTS

STAFF COLLEGE, QUETTA

Wing Cdr. J. H. D'Albiac, D.S.O., *p.s.a.*, has completed satisfactorily the course at the Staff College, Quetta, which terminated on Dec. 17, 1934.

R.A.F. STAFF COURSE, 1935

It has been found necessary to amend the dates of the terms of the R.A.F. Staff Course, 1935. The amended dates are as follow:—1st term, Jan. 22 to April 12; 2nd term, May 13 to Aug. 2; 3rd term, Sept. 23 to Dec. 20.

ADVANCED SUPPLIES COURSE

Wing Cdr. G. Stevens, O.B.E., having successfully completed the Advanced Supplies Course held at the R.A.S.C. Training Centre, Aldershot, terminating on December 20, 1934, is granted the symbol "C."

THE EXPANSION PROGRAMME

The following special additional measures will be taken to meet the increased requirements of personnel consequent on the decision of H.M. Government to expand the Air Force:—

(i) *Extensions of Service to 14 Years.*—Ex-apprentice airmen in group I trades who are due for discharge on completion of 12 years' service before April 1, 1937, will be considered for extension of service to 14 years' regular service followed by 4 years' reserve service.

(ii) *Extensions of Service to 12 Years.*—Airmen of all trades whose engagements are for less than 12 years' regular service and who have completed, or will have completed by April 1, 1937, 9 years' regular service, will be considered for extension of service up to a total of 12 years' regular service.

(iii) *Extensions of Service to 7 or 9 Years.*—The standard engagement periods for non-apprentice airmen are, at present, as follows:—

Aircrafthands, except those mentioned below, 7 years' regular service. All other airmen, including those mustered in a subtrade of group V and aircrafthands qualified as service policemen, physical training instructors, or air gunners, 9 years' regular service. Airmen whose engagements are for a shorter period of regular service than that specified above as appropriate to them will be considered for extensions of service up to the appropriate period, provided that their service is in all respects satisfactory.

GORDON SHEPHARD MEMORIAL PRIZE

The following will be the subject of the Gordon Shephard Memorial Prize Essay for 1935-1936.

"The varied defence commitments which devolve on the R.A.F. require the employment of squadrons on many different duties, and the provision for them of aircraft of very different types.

"Discuss this question and indicate what, in your view, is the minimum number of types of aircraft which must be provided for the R.A.F. and what are the operational requirements to be laid down for each type. These operational requirements include range, load, equipment of all kinds, crew, minimum alighting and take-off area. Performance, if laid down in figures, should be feasible according to the standard of to-day. Careful regard must be paid throughout to the question of cost and the consequent desirability of limiting the sizes of aircraft and the number of types to the minimum consistent with operational requirements."

THE CALWELL BEQUEST

In accordance with a generous bequest contained in the will of the late F/O. A. K. K. Calwell, a sum of approximately £2,600 is invested under a scheme by which the trustee, who is the Secretary of State for Air, can apply the income for the benefit of persons being in need of assistance and being the widows or the children of officers who held commissions in the Royal Air Force and who died as the result of flying accidents while on duty. The late F/O. Calwell was commissioned on Sept. 18, 1926, and served with No. 26 (A.C.) Squadron and No. 208 (A.C.) Squadron, being subsequently posted to the Electrical and Wireless School, Cranwell. He died on Sept. 27, 1930, as a result of injuries received in a motor accident. Enquiries in regard to grants from the Calwell Bequest should be addressed to the Secretary, Air Ministry, Adastral House, Kingsway, W.C.2. It should be noted that grants are strictly limited to persons who come within the terms of the scheme as specified.

R.A.F. SQUADRONS TO BE RE-FORMED

The numbers allocated to the squadrons forming in the financial year 1935 are as follows:—No. 21 (Bomber) at Upavon, No. 34 (Bomber) at Upavon, No. 42 (Bomber) at Donibristle, No. 46 (Fighter) at Henlow, No. 48 (General Purpose) at Manston, No. 66 (Fighter) at Duxford, No. 74 (Fighter) at Hornchurch, No. 83 (Bomber) at Upavon, No. 97 (Bomber) at Mildenhall, No. 104 (Bomber) at Bircham Newton and No. 151 (Fighter) at North Weald.

NO. 205 (F.B.) SQUADRON

The three "Singapore 3" flying boats for re-equipping No. 205 (F.B.) Squadron arrived at Singapore on March 5. Two days before, a "Southampton" of that squadron was holed while entering the Calcutta waterway, was beached, but was submerged at high tide. As the old "Southamptons" of the squadron are to be "written off," this mishap is not of much consequence. Originally, it was intended to fly the "Southamptons" to England, but the cost was considered more than the value of the obsolete aircraft.

ZEEBRUGGE—OSTEND REUNION DINNER

Admiral of the Fleet Sir Roger J. B. Keyes, Bt., G.C.B., K.C.V.O., C.M.G., D.S.O., M.P., will preside at the Zeebrugge-Ostend annual reunion dinner, to be held at the Mayfair Hotel, Berkeley Square, W.1, on Tuesday, April 23, 1935.

Any officer who has not received a notice is requested to communicate with Lt. J. C. Keith-Wright, D.S.C., 2, Crosby Square, E.C.3.

BERTRAND STEWART PRIZE ESSAY

The subject for the Bertrand Stewart Prize Essay (for particulars *see Army Quarterly*) for 1936, is as follows:—

"The 19th century witnessed the transition from professional armies to the nation in arms, until the climax was reached in the war of 1914-18, when, in the words of Ludendorff:—

'It was impossible to distinguish where the sphere of the army and navy began and that of the people ended. Army and people were one. The world witnessed the war of nations in the most literal sense of the word.'

Extract from 'My War Memories,' Vol. I, page 2.

Realising this, the world is seeking the means to restrict war again to the fighting services and to protect the 'non-combatant' on land and sea.

(*a*) How far are such restrictions to the action of the fighting forces practicable and desirable?

(*b*) Assuming that the restrictions you propose are adopted by International Convention, what effect would they have on the general composition and disposition of the Navy, Army and Air Force?"

THE R.A.F. BENEVOLENT FUND

The usual meeting of the Grants Committee of the above Fund was held at Iddesleigh House on April 2. Mr. W. S. Field was in the chair, and the other members of the Committee present were Mrs. L. M. K. Pratt Barlow, O.B.E., and Wing Comdr. H. P. Lale, D.S.O., D.F.C. The Committee made grants to the amount of £176 9s. 9d. The next meeting was fixed for April 16th.

FOREIGN OFFICERS WITH THE R.A.F.

Capt. Arimori, of the Japanese Military Air Service, has been attached to the Central Flying School, Wittering, from April 1 to 18, 1935, for Flying Refresher Course. Capt. Napakas, of the Siamese Air Force, is attached to No. 32 (Fighter) Squadron, Biggin Hill, from April 2 to 18, 1935, and to No. 1 Squadron, Tangmere, from April 23 to May 18, 1935.

Lieutenants Sparre and Hanson, of the Swedish Air Force, have been attached to the Royal Air Force Base, Leuchars, for catapult training.

R.U.S.I. LENDING LIBRARY

The use of the lending library of the Royal United Service Institution is now included in the comprehensive subscription of £1 5s. per annum (entrance fee £1 1s.). Members are entitled to borrow four volumes at a time. The library has recently been re-catalogued, and contains practically every work of service interest. The latest additions are announced in the quarterly Journal which is included in the subscription.

ROYAL AIR FORCE GAZETTE

London Gazette, April 2, 1935

General Duties Branch

A.P/O. on probation R. N. J. White is confirmed in rank and graded as Pilot Officer (March 16).

The following are promoted with effect from April 1:—

FLT. LTS. TO BE SQN. LDRS.—E. Burton, E. P. M. Davis, A.F.C., A.M., A. J. Warwick, R. Ivelaw-Chapman, D.F.C., A.F.C., R. B. Sutherland, D.F.C., J. W. F. Merer, E. S. Moulton-Barrett, H. N. Hampton, D.F.C., A. D. Rogers, A.F.C., H. A. Hamersley, M.C., C. H. Harrison, F. F. Garraway, W. A. B. Savile, H. G. Sawyer, A.F.C., C. T. Walkington, C. Hallawell, J. H. Winch, F. M. R. Stephenson (Lt. Cdr., R.N.), J. I. Robertson (Lt. Cdr., R.N.).

FLYING OFFICERS TO BE FLT. LTS.—E. H. Shattock (Lt. Cdr., R.N.), J. P. G. Bryant (Lt., R.N.), P. W. Humphreys (Lt., R.N.), K. Williamson (Lt., R.N.), R. E. Gunston (Lt., R.N.), A. C. R. Duvall (Lt., R.N.).

The following Flying Officers are promoted to the rank of Flt. Lt.:—L. A. Cubitt (Feb. 28), B. N. Matson (March 13).

The following Pilot Officers are promoted to the rank of Flying Officer (March 12):—J. W. Young, I. J. McGhie, H. L. Fry.

Air Comdre. A. W. Bigsworth, C.M.G., D.S.O., A.F.C., is placed on the half-pay list, scale A (April 1). F/O. G. R. A. Elsmie is placed on the half-pay list, scale B, from March 21 to 29 inclusive. Lt. P. W. Humphreys, R.N., Flying Officer, R.A.F., ceases to be attached to the R.A.F. on return to Naval Duty (Jan. 7) (substituted for the notification in the *Gazette* of Jan. 22). Group Capt. T. G. Hetherington, C.B.E., is placed on the retired list on account of ill-health (March 31). Sqn. Ldr. L. J. Maclean, M.C., is placed on the retired list on account of ill-health (April 1). F/O. P. Y. Davoud resigns his permanent commission (March 31)

Stores Branch

Flt. Lt. L. H. Hillier is promoted to the rank of Sqn. Ldr. (April 1).

Accountant Branch

Flt. Lt. L. de L. Leder is promoted to the rank of Sqn. Ldr. (April 1).

Medical Branch

The following Flt. Lts. are granted permanent commissions in that rank (April 3):—F. H. Peterson, M.D., M.C.P. and S.; J. L. Walsh, M.B., B.S.

Flt. Lt. A. H. Barzilay, M.B., Ch.B., is transferred to the Reserve, class D (April 2).

ROYAL AIR FORCE RESERVE

Reserve of Air Force Officers

General Duties Branch

F/O. P. Y. Davoud is granted a commission in this rank in class C on resignation of his permanent commission in the R.A.F. (March 31).

SPECIAL RESERVE

General Duties Branch

The following are granted commissions as Pilot Officers on probation:—M. H. Taylor (March 9); P. Green (March 12).

AUXILIARY AIR FORCE

General Duties Branch

No. 604 (COUNTY OF MIDDLESEX) (FIGHTER) SQUADRON.—J. A. Davies is granted a commission as Pilot Officer (March 10).

ROYAL AIR FORCE INTELLIGENCE

Appointments.—The following appointments in the Royal Air Force are notified:—

General Duties Branch

Flight Lieutenants.—P. Jones, to No. 201 (F.B.) Squadron, Calshot, 27.3.35. J. A. H. Louden and J. G. W. Weston, to Special Duty List, 23.3.35; on exchange with Royal Canadian Air Force Officers. N. Young, to D.O.I., Dept. of C.A.S., Air Ministry, 25.3.35. W. G. Abrams, to Short R.6/28 Flying Boat, Calshot, 25.3.35. V. S. Bowling, to No. 41 (F) Squadron, Northolt, 25.3.35. C. D. C. Boyce, to R.A.F. Base, Leuchars, 28.3.35.

Flying Officers.—D. M. Lynch-Staunton, to No. 607 (County of Durham) (B) Squadron, Usworth, 25.3.35. D. G. Morris, to No. 2 Flying Training School, Digby, 26.3.35. E. S. Butler, to Air Armament School, Eastchurch, 27.3.35.

Pilot Officers.—G. A. V. Clayton, to No. 201 (F.B.) Squadron, Calshot, 27.3.35. K. E. Cornabé, to No. 201 (F.B.) Squadron, Calshot, 27.3.35. A. A. de Gruyther, to No. 201 (F.B.) Squadron, Calshot, 27.3.35. P. D. W. Hackforth, to No. 209 (F.B.) Squadron, Mount Batten, 27.3.35. H. J. Hobbs, to No. 201 (F.B.) Squadron, Calshot, 27.3.35. W. A. Hughes, to No. 210 (F.B.) Squadron, Pembroke Dock, 27.3.35. A. F. Spurrier, to No. 209 (F.B.) Squadron, Mount Batten, 27.3.35.

Stores Branch

Flight Lieutenants.—R. B. Brown, to Special Duty List, 23.3.35; on exchange with Royal Canadian Air Force Officer. W. C. Farley, to No. 1 Air Defence Group Headquarters, 26.3.35. F. A. Skoulding, to Aircraft Park, India, Lahore, 1.3.35.

Flying Officer.—A. Wall, to No. 3 Stores Depot, Milton, 28.3.35.

Accountant Branch

Flying Officer.—G. A. Linn, to Home Aircraft Depot, Henlow, 25.3.35; on appointment to a permanent commission as Commissioned Accountant Officer.

Medical Branch

Squadron Leader.—A. A. Townsend, to No. 1 Air Defence Group Headquarters, 28.3.35; for duty as Medical Officer.

Flight Lieutenant.—W. P. Stamm, to No. 8 (B) Squadron, Aden, 24.2.35.

Flying Officer (Medical Quartermaster).—L. Jones, to R.A.F. Hospital, Aden, 13.3.35.

A GROUP under *Syrinx* during the visit of the Egyptian Mission of Economic Inquiry to Croydon last Saturday. Received by Lt. Col. F. C. Shelmerdine, D.C.A., the members—Their Excellencies Hafez Afifi Pasha, Mohamed Talant Harb Pasha, Sadik Henein Pasha, Youssef Naha Bey and Mohamed Ahmed Fanghali Effendi—inspected the aerodrome, lighting equipment and administrative buildings. Machines inspected included an Autogiro C.30, A.W. "Scimitar II," "Dragon Rapide" of the Olley Air Services, Spartan "Cruiser," Saro "Cloud," Airspeed "Envoy" and a Short "Scion." During the morning the party went for a flight over London.

FOREIGN AIRCRAFT

A BOEING "EXPORT" FIGHTER

New Model Developed from the P-26A : 232 m.p.h. : Range of 745 Miles

A 550 h.p. supercharged "Wasp" gives the Boeing 281 a speed of 232.5 m.p.h. The "treadle" type undercarriage is an interesting feature.

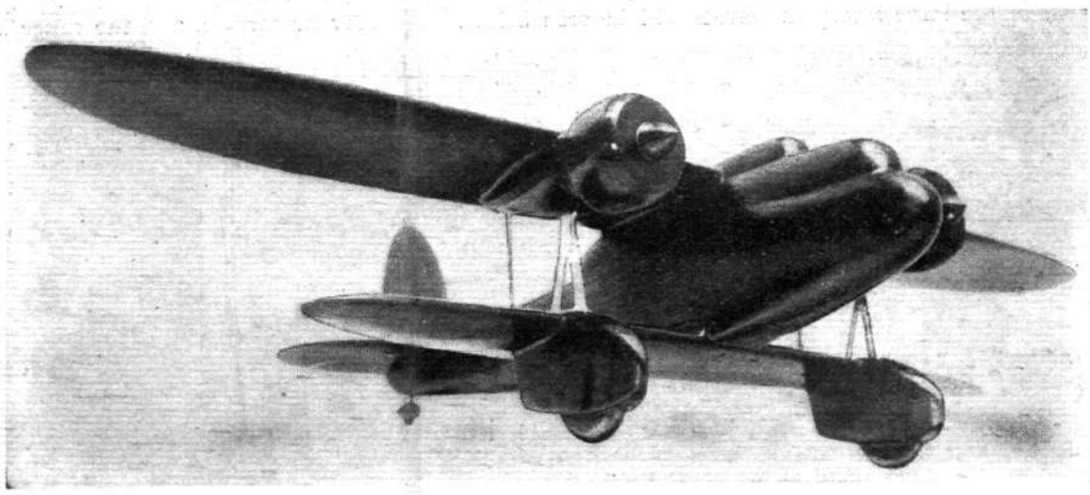
THE performance of the Boeing P-26A has, since the machine first appeared, been largely a matter of conjecture to those outside American circles. Recently, however, an "export" version of this machine has been developed, which is almost identical with the U.S. Army type. It is known as the Model 281, and performance data on this type have now been released.

An all-metal, low-wing, single-seater fighter, the machine is fitted with a supercharged Pratt and Whitney "Wasp" giving 550 h.p., and may be operated in any one of three conditions. As a fighter, with "normal" fuel and equipped with two 0.30 calibre machine guns, or one 0.30 and one 0.50 calibre gun, it has a maximum speed of 232.5 m.p.h. and a range of 386 miles at a cruising speed of 210 m.p.h. Equipped as a fighter, but carying "maximum" fuel and the same military load, it has a top speed of 230.5 m.p.h. and a range of 745 miles, cruising at 208 m.p.h. With "normal" fuel the fighter version climbs to 17,900 ft. in ten minutes, and has a service ceiling of 28,200 ft. Operating as a fighter-bomber, it can carry either five 30 lb. bombs, or two 122 lb. bombs at a top speed of 221 m.p.h.

Of semi-monocoque construction, the fuselage embodies aluminium alloy bulkheads, longerons, skin stiffeners, and smooth-skin covering. The engine mounting is a welded-steel-tube structure, and is readily detachable from the fuselage. The wing is divided into three parts—the wing stubs, built integral with the fuselage, and two outboard panels. These latter are braced by stainless steel streamlined wires. Spars of build-up I section and Warren truss-type ribs are employed for the wing, which is covered with smooth aluminium alloy skin.

All-metal cantilever construction is used for the tail surfaces. These are easily removable from the fuselage. The tail plane is not adjustable, longitudinal trim being effected by small flaps let into the elevators and controlled from the cockpit. A small trailing-edge rudder "tab" provides for correction of slight rigging variation. No aerodynamic balance is incorporated in the rudder but the elevators have an "over hung" leading edge, which tends to reduce forces on the control column, ensuring, it is claimed, lightness of control even in the most severe "pull outs" from dives. Trailing edge flaps are fitted to the wing, and are claimed to increase the angle of approach and reduce landing speed.

Of "treadle" type, the undercarriage is so designed that the wheels may be easily removed. Boeing oleo shock-absorbers, 24 in. streamlined tyres, and individually operated wheel brakes are provided. The steerable tail wheel is also equipped with a pneumatic tyre.

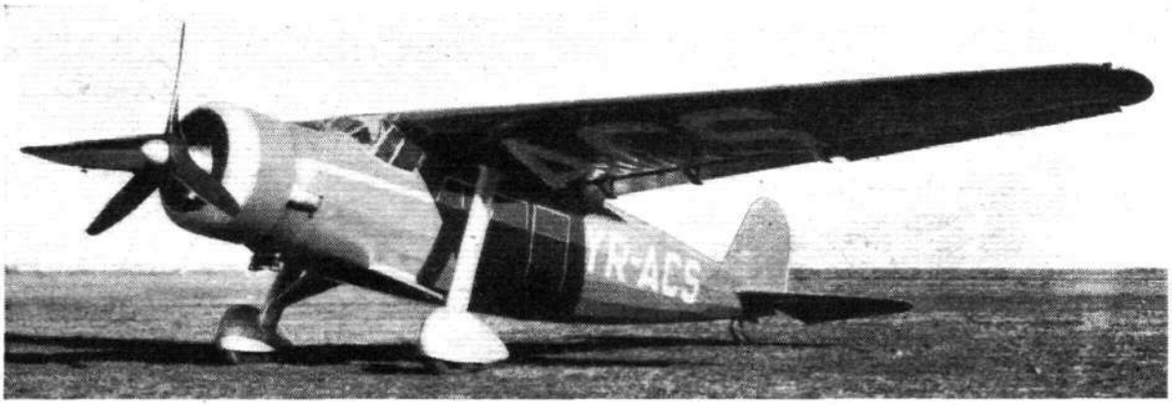


A BOLD BELGIAN EFFORT. This is a photograph of a model of the Stampe et Vertongen S.V.-10 multi-seater bombing, reconnaissance and fighting machine now being constructed for the Belgian Government. It will have two Gnome Rhone 14 Krsd radials of 800 h.p. A maximum speed of 217 m.p.h. is called for by the contract, but this figure will probably be exceeded.

Foreign Aircraft (Cont.)

NEW RUMANIAN COMMERCIAL MONOPLANE

Six Passengers Carried at 155 m.p.h. : 360 h.p. Siddeley "Serval" Engine



Workmanlike in appearance, the Rumanian I.C.A.R. commercial monoplane cruises at 130 m.p.h. with six passengers. The long-chord cowling of the 360 h.p. Siddeley "Serval" radial is noteworthy.

A VERY sturdy, high-wing cantilever monoplane has recently been built by Intreprindere pentru Constructii Aeronautice Romane, of Bucarest, and has successfully completed its flight trials. The machine is of mixed construction, the cantilever wing embodying a single spar and being built in one piece. The ribs are of Rumanian spruce and the whole wing is covered with plywood. Flaps are fitted inboard of the ailerons, which have differential control.

Welded steel chrome molybdenum tubing is used for the fuselage and engine mounting, the fuselage, in the main, being covered with fabric. An adjustable tail plane is fitted, and the trailing edge of the rudder embodies a small "tab" for trimming purposes.

Dual control is provided in the pilots' cockpit, which is placed beneath the leading edge of the wing and is totally enclosed. The cabin contains six armchairs and an individual ventilator is provided near each seat. There is a roomy baggage compartment.

A geared Armstrong Siddeley "Serval" ten-cylinder two-bank radial engine, giving a maximum output of 360 h.p. at 2,200 r.p.m. and driving a three-bladed wooden airscrew, is mounted in the nose of the fuselage, and is fitted with an N.A.C.A. cowling. Four petrol tanks are placed in pairs within the wings close to the fuselage and centre of gravity.

A maximum speed of 155 m.p.h. (250 km./hr.) is claimed, the cruising speed being 130 m.p.h. (210 km./hr.). The ceiling is 16,400ft. (5 000 m.) and the climb to 9,840ft. (3 000 m.) occupies 16 minutes. Empty, the machine weighs 2,910 lb (1 320 kg.), the gross weight being 4,960 lb. (2 250 kg.).

STEMMING THE MONOPLANE TIDE

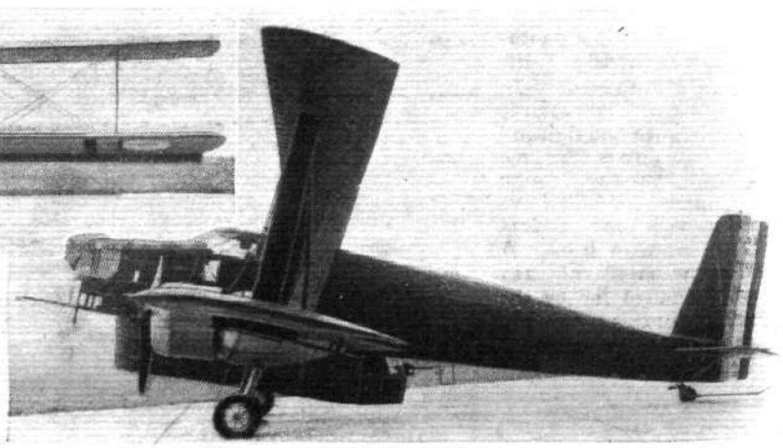
THE majority of the new French *multiplace* machines are monoplanes, so it is refreshing to find a French heavy bomber, the LeO.208, for which the biplane, or at least the sesquiplane, formula has been retained. Liore et Olivier biplanes have, of course, long been standard bombing equipment in the French air service, and the new machine, instead of being radically new, like the other French "heavies," depends for its qualities of performance and load carrying on modern refinements.

Structurally, it follows standard Liore practice, duralumin being employed for wings and fuselage. Perhaps the most notable external feature is the small top plane, equal in span to the lower (which, incidentally, is fitted with flaps), but of considerably shorter chord. This arrangement provides a wide field of fire. The unusual arrangement of the large interplane struts will be seen below.

In the nose of the rectangular fuselage is an ingenious gun turret of the type illustrated in *Flight* of December 27, 1934, and the enclosed pilot's compartment is located just forward of the wings. A kind of "car" is slung beneath the fuselage, and carries at its rear end a Lewis gun for downward firing. A third gun position, for one or two machine guns, is provided on top of the fuselage behind the wings.

The two engines, which drive controllable-pitch airscrews, are Gnome-Rhone K.14's or Mistral Majors, giving 815 h.p. at 7,150ft., and 1,065 h.p. for take-off. They are provided with N.A.C.A. cowlings, and are mounted in the noses of nacelles into which the two pairs of landing wheels retract. It is claimed by the makers that the top speed at 13,120ft. is 202 m.p.h. Up to 2,645 lb. of bombs may be carried, and the range is 1,243 miles.

(Above) A view which shows the unusual interplane bracing, the unorthodox undercarriage and the hanging "car."



(Right) Note the overhanging turret in the nose and the small chord of the upper wing.

HERE and THERE

An Italian Invitation

Through the Royal Aero Club, the Aero Club of Italy has extended a hearty welcome to British private air tourists to take part in the International Raduno del Littorio from August 24 to 30. Starting with a rally at the Littorio aerodrome, the week will consist of a touring competition round Italy; results will be decided on the formula:

$$M = \frac{200\ Vm}{W}$$

where

M = number of points
Vm = average speed of flight
W = engine horse-power

There will also be prizes for the rally, results being worked out from a formula based on distance, speed, horse-power, wing-loading and number of occupants.

Regulations are obtainable through the Royal Aero Club.

Ambassadorial Airmindedness

Sir Francis Humphrys, the first Ambassador to Iraq, recently left Baghdad by air at the end of his term of office. His departure recalls the evacuation of Kabul in 1929, when over six hundred Europeans were flown to safety by the R.A.F. When Sir Francis first went out to Iraq as High Commissioner he was flown from Egypt to Baghdad by the same pilot and in the same machine as that in which he left Kabul. One of his most treasured possessions is the control wheel of the machine.

Officers of No. 70 (B.T.) Squadron, which effected the Kabul rescues, are invited to a dance given each year by Sir Francis and Lady Humphrys, and at the annual dance this year the Ambassador and his wife presented a trophy to the C.O. of the Squadron. Sir Francis is himself a pilot, and has flown a great deal in Iraq in his own "Leopard Moth."

R.A.F. Autogiro Crash Report

The Air Ministry has issued the following accident report:—

"On the 21st January, 1935, near Old Sarum Aerodrome, a Royal Air Force Autogiro (Rota, Type C.30A) was involved in an accident which resulted in the wrecking of the aircraft and the death of the pilot. The aeroplane entered a cloud when flying straight and level at a height of about 1,500 to 2,000 ft., and emerged about half a minute later in a steep dive, in which it remained until it struck the ground. The accident occurred in the course of Service training and while the pilot, who had been a qualified Royal Air Force pilot for more than two years, was carrying out his fourth solo flight in this new type of aircraft.

"As the result of his investigations the Inspector of Accidents has come to the conclusion that no structural failure of the aircraft or defect in its control mechanism occurred during the flight. He considers that the cause of the accident cannot be definitely determined, but that the evidence suggests, as the most likely cause, that in the course of flying training under Service conditions, made difficult by low-lying cloud, the aircraft in diving had been allowed to reach a speed at which, owing to longitudinal instability, it had become uncontrollable."

Comment on this report appears on p. 379.

A Flying Easter in Morocco

Those who favour the idea of a flying Easter holiday abroad should get in touch with the Secretary of the Royal Aero Club for details of a rally which, as recently announced in *Flight*, is being organised by the Aero Club of Morocco. The event is to be a tour around Morocco and competitors will have to conform to certain easy rules. Seven cups are being presented for time-keeping.

The course starts from Casablanca on April 22, and lies through Safi for the lunch stop to Agadir, where the first night is spent. Next day, sea fishing is arranged before a short afternoon flight to Taroudant. On Wednesday, April 24, the course is over the Atlas Mountains to Marrakech. The whole of Thursday is spent there either visiting the town or taking part in a wild-pig hunt. On April 26 the journey is continued to Azrou, where a stop is made for lunch alongside a trout lake wherein anglers may indulge their passion before flying on to Fez for the night. Saturday's flight is only a short one of 50 km. to Meknes. On Sunday, the final day of the tour, lunch is taken at Rabat before arriving at Casablanca, where a farewell banquet is held.

An inclusive charge of 750 Fr. is made for the seven days, while petrol costs from 1.20 to 1.65 Fr.

A Chance for Budding Authors

Sir Philip Sassoon (Under-Secretary of State for Air), Mr. David Garnett (author of "A Rabbit in the Air," "Lady into Fox," and other books), and Mr. Grover Loening (the well-known American aircraft constructor) have consented to act as judges in a flying-book authorship competition now being organised.

The prize is £500 in advance on account of royalties, and works of fiction, personal experience, autobiography, biography or history are all eligible, provided aviation is the theme. Full particulars are obtainable from Hamish Hamilton, Ltd., 90, Great Russell Street, London, W.1.

Full-blooded Fiction

With the laudable object of providing opposition to the American air fiction magazines which are flooding the country, a magazine called "Air Stories" is appearing to-day, and will be published monthly by George Newnes, Ltd., at sevenpence. Its style is frankly sensational—but we shall not be surprised to see others apart from schoolboys among its readers.

Aero Golfing Society at Felixstowe

The Martlesham and Felixstowe Air Stations entertained the Aero Golfing Society on Saturday, March 30, at the Felixstowe Golf Club, and won by 13½ games to 7½ games. The scoring was as follows (Air Station players mentioned first in each case):—

FOURSOMES.—Sqn. Ldr. P. C. Wood and F/O. Morris *v.* Sir Robert McLean and A. J. A. Wallace Barr, 0–1; Flt. Lt. E. D. Barnes and Flt. Lt. C. B. Wincott *v.* L. Massey Hilton and H. B. R. Gray-Edwards, 0–1; Flt. Lt. H. G. Sawyer and Flt. Lt. J. Bradbury *v.* Cdr. H. E. Perrin and J. Summers, 1–0; Flt. Lt. D. Menzies and Sqn. Ldr. E. C. Emmett *v.* C. R. Fairey and R. J. Bone, 1–0; Flt. Lt. E. B. Steedman and F/O. R. G. M. Apthorp *v.* Sqn. Ldr. C. J. W. Darwin and E. Fulford, 0–1; Group Capt. A. C. Maund and Flt. Lt. W. N. Plenderleith *v.* Flt. Lt. P. W. S. Bulman and F. Handley Page, 0–1; Capt. W. Dancy and Sqn. Ldr. H. W. McKenna *v.* Capt. A. G. Lamplugh and Sqn. Ldr. T. H. England, 1–0.

SINGLES.—Sqn. Ldr. P. C. Wood *v.* Sir Robert McLean, 1–0; F/O. Morris *v.* A. J. A. Wallace Barr, 1–0; Flt. Lt. E. D. Barnes *v.* L. Massey Hilton, 1–0; Flt. Lt. C. B. Wincott *v.* H. B. R. Gray-Edwards, ½–½; Flt. Lt. H. G. Sawyer *v.* J. Summers, 1–0; Flt. Lt. J. Bradbury *v.* Cdr. H. E. Perrin, 1–0; Flt. Lt. D. Menzies *v.* C. R. Fairey, 0–1; Sqn. Ldr. E. C. Emmett *v.* R. J. Bone, 1–0; Flt. Lt. E. B. Steedman *v.* E. Fulford, 0–1; F/O. R. G. M. Apthorp *v.* C. J. W. Darwin, 1–0; Group Capt. A. C. Maund *v.* F. Handley Page, 1–0; Flt. Lt. W. N. Plenderleith *v.* Flt. Lt. P. W. S. Bulman, 1–0; Capt. W. Dancy *v.* Capt. A. G. Lamplugh, 1–0; Sqn. Ldr. H. W. McKenna *v.* Sqn. Ldr. T. H. England, 0–1.

The R.Ae.C. Touring Concessions

As reported in *Flight* last week, the Royal Aero Club has entered into arrangements with a number of countries whereby British private air tourists who are members of the Club will not be charged landing fees, and will be entitled to free garage for their aircraft for a period of forty-eight hours. The Club has now issued the first list of aerodromes to which the concession applies:—

ITALY.

Customs Airports for Aeroplanes.—Bari, Brindisi, Catania, Cagliari (Elmas), Falconara, Milan (Taglieda), Naples (Capodichino), Palermo (Boccadifalco), Pisa (S. Giusto), Rome (Littorio), Sarzana, Torino (Mirafiori), Trente (Gardolo), Udine (Campoformido), Venice (San Nicolo di Lido), Assab (Eritrea), Bengasi, Massaua Mogadiscio, Tessenei (Eritrea), Tobruch, Tripoli (Mellaha).

Customs Airports for Seaplanes.—Ancona, Brindisi, Cagliari (Elmas), Como, Genoa, Rome (Ostia), Naples, Palermo, Siracusa, Terranova Pausania, Trieste, Venice (S. Andrea), Zara, Bengasi, Massaua, Tobruch, Tripoli.

Airports without Customs facilities.—Bologna, Belzano, Boscomantico, Ferrara, Firenza, Foggia, Loreto, Novara, Padwa, Pescara, Ponte San Pietro, Siena, Rimini, Vercelli, Vicenza, Sirte.

Seaplane Ports without Customs facilities.—Lagosta, Pavia, Portorose, San Remo, Sesto Calenda, Torino, Abbazia, Alassio, Fiume, Lussino, Stresa, Torre del Lago, Varezze.

AUSTRIA.

Vienna (Aspern), Graz (Thalerhof), Klagenfurt (Annabichl), Linz (Donau).

HUNGARY.

Customs Airport.—Budapest (Mátyásfold).

Private Aerodrome.—Siófok (Kiliti), on the Lake of Balaton.

State Airports without Customs facilities where previous permission to alight must be obtained from the Royal Hungarian Aeronautical Bureau.—Székesfehérvár, Szombathely, Kaposvár, Pécs, Miskolcz, Szeged, Nyiregyháza, Debreczen.

Foreign air tourists visiting Great Britain and producing the F.A.I. Identity Card issued by their national aero clubs will be entitled to similar facilities at the following airports:—

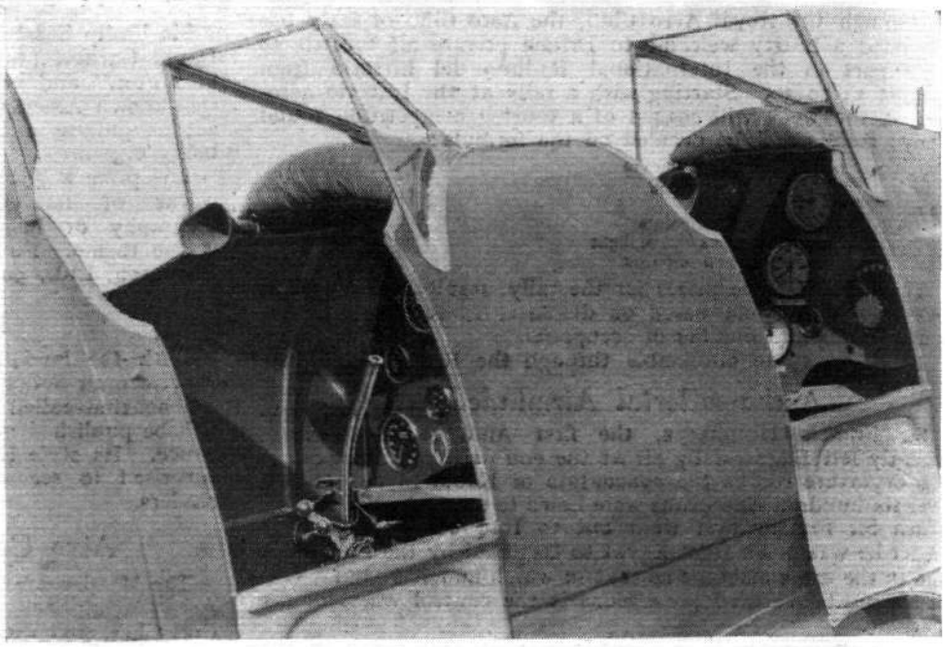
Customs Airports.—Abridge (Essex Airport), Bristol (Whitchurch), Croydon, Gravesend, Heston, Liverpool, Lympne, Newtownards (Northern Ireland).

Airports at which Customs facilities are not available.—Brooklands, Brough Gatwick, Hanworth, Hatfield, Leicester (Braunstone), Renfrew, Scarborough (Ganton), Sherburn-in-Elmet, Shoreham, Southampton (Eastleigh), Sywell, Yeadon.

Negotiations are now proceeding with other airports in Great Britain.

A FLYING LABORATORY

Measuring Petrol, Oil, Induction and Cylinder Temperatures in an Aircraft in Flight



The front cockpit of the Miles "Hawk Major" has been very fully equipped with instruments for indicating the temperatures of petrol, oil, cylinder heads, etc. (*Flight* photograph.)

THE late Lord Kelvin remarked that it was not until you were able to measure something that you really knew anything about it, and modern engineering and applied science have been acting more and more on this dictum. At early stages of development progress in aeronautics and the design of aircraft engines was to some extent a matter of rule-of-thumb, but as efficiency has progressed designers have had to use exact knowledge to an ever-increasing extent.

A knowledge of the subject could in no sense be called complete without information as to the behaviour of both fuel and lubricating oil under working conditions. Engine tests have for some years been the final and only way of judging the value of a fuel or lubricating oil, but such tests in the laboratory have a disconcerting habit of being incomplete when applied to the practical conditions of multi-cylinder engines actually in flight.

It has remained for the Shell-Mex and B.P. organisation, pioneers of the use of aircraft in connection with sales in this country, to produce a "flying laboratory" in which all readings necessary to observe the behaviour of fuel or lubricating oil can be taken in full flight.

The machine thus adapted for the purpose is a Miles "Hawk," engined with a "Gipsy Major." The front cockpit has been adapted for a technical observer by the addition of an instrument board from which the following facts can be observed and noted in the course of flight: (*a*) Height, r.p.m., air speed, oil pressure, and (*b*) the temperatures of (1) inlet oil to the oil tank, (2) outlet oil, (3) surrounding air, (4) induction pipe, (5) petrol, (6) all four cylinders at the sparking plugs, and any one selected cylinder barrel

Mr. G. M. Wilson, deputy general manager of Shell-Mex, receiving the log-books of the "Hawk Major" from Mr. Powis and Mr. Miles at Reading last week. (*Flight* photograph.)

The ranges of these temperatures are from $-60°$ F. (possible air, fuel, or mixture temperatures) to $+600°$ F. at the plugs. The observer sitting in the cockpit can note, in a special type of log-book, all these readings at desired intervals of time from the dials. Recording instruments are not used owing to their greater complication, greater weight, and the chance of their going wrong under vibration.

The low temperatures are taken by a special design of ether-bulb thermometer, which is either strapped on to the surface for such items as the air temperature and induction temperature, or actually inserted in the fluid for the oil temperatures and petrol temperature. The cylinder temperatures are taken by a special design of thermo-couple resembling a plug washer with a tag which is clipped under the sparking plug, and the cylinder barrel temperature by a thermo-couple clipped on between two or the fins, or, alternately, riveted into the thickness of the cylinder wall.

The temperatures at all these points are read on a special type of galvanometer by the use of a distribution switch. By means of these readings it is possible to form a complete picture of what the engine is doing in flight, and such questions as behaviour of lubricating oil, carburation efficiency, induction temperature, freezing in the carburetter, induction overheating, and several other points can be measured and observed at the most important time when they are actually taking place and when the machine is in mid-flight. The observer is in communication with the pilot by means of the usual headphones, and can therefore call for any special operations required.

Internal Air Lines and Ground Transport

The importance of fast ground transport between aerodromes and the towns they serve was stressed by Lt. Cdr. C. N. Colson, R.N., of *Flight*, when speaking to the Leeds and District section of the Institute of Transport last Friday. Other points of the lecture—which dealt with air transport and its potentialities both at home and abroad—were the high cruising speed which was necessary to make air transport in England worth while; the possibilities of overnight air mail services; the need for an Empire-wide air service; and the harm of uninformed comparisons between British air services and those of other countries.

PRIVATE FLYING

The Homeward Journey

LORD SEMPILL DESCRIBES THE CAPE YORKE TO PAPUA SECTION OF HIS FLIGHT

THE next stage of my flight to Cape Yorke—the northernmost point of the Australian Continent—being just too far for the range of my machine, I decided after leaving Townsville to land and take on a full load of fuel at Cairns. It is noteworthy that just before arriving there one passes over Innisfail, which is probably one of the wettest places in the world, as, on an average, rain falls on 300 days in the year, the total rainfall being very heavy. This is especially remarkable, seeing that conditions in the country generally, even a few miles to the north and south, are quite different, droughts for long periods being not infrequent.

The aerodrome at Cairns is unlicensed, Mr. MacDonald, to whom I have previously referred, being largely responsible for such facilities as it provides. It is actually a dried mud pan and, provided there is no rain and no spring tide, it makes a good landing place. After rain, however, it is dangerous, but efforts are being made to improve it.

A 600-mile Hop

AFTER filling my tanks to capacity in preparation for the 600-mile flight to Cape Yorke, I set off once more, the petrol company's representative having kindly supplied me with some sandwiches and a Thermos flask of tea. I also took on board a supply of oranges, as in the extreme north there is no fruit of any kind at that season.

After Cooktown, which is about 100 miles north of Cairns, there is no intermediate landing ground, and the population, which is confined to a few natives, is very sparse. The flight from Cairns to Cape Yorke was, for the first few hundred miles, not nearly as interesting as it should have been, as the visibility, due to the tremendous dust storm that was drifting over from Central and West Australia, was very poor. To avoid these conditions would have meant flying at well over 8,000 ft., an impractical course in view of the strong headwinds at that altitude. The coast line in those regions is in places very mountainous. An interesting feature is the gradual change in the colour of the sand which, from a normal golden hue, changes to pure silver as one proceeds northwards. There seemed to be very little animal life, and such birds as I saw, which were of an entirely indigenous type, appeared to keep to the little island lagoons.

Pearling Luggers

WHEN within 150 miles of Cape Yorke I came across a number of pearling luggers, manned mostly by native crews. The weather cleared a little when I arrived at Cape Yorke after 6½ hours' flying, and I was able to find the landing strip which had been prepared by Mr. Vidgeon, who is a grandson of one of the great Australian pioneers, Mr Jardine, a member of the family concerned with the setting up of one of the greatest business houses in the Empire and certainly in the Far East—that of Jardine, Mathieson and Co.

Before leaving Brisbane I had obtained all possible information about Cape Yorke and the site of the landing ground, but so little is this part known that I was prepared for certain discrepancies in the information supplied I found the ground was not very far from a station owned by Mr. Vidgeon, who is much to be congratulated on all the hard work he has put in in his spare time to prepare this landing strip, which has good approaches from each direction.

The work involved must have been tremendous, as it not only entailed cutting down thick bush and grubbing out the roots, but, what is even more arduous, the removing of numerous anthills. These anthills resemble remains such as those at Stonehenge and average 12 ft. in height, with a diameter at the base of about five feet. The earth of which they are constructed is packed so hard by the insects plus the action of the wind, sand and rain that it needs a pickaxe to make any effect on them. So industrious are the ants that special precautions have to be taken, otherwise one finds that the hills are speedily rebuilt and the ground, which may be quite suitable one day, is quite unfit for use the next.

Immediately I landed I was met by Mr. Vidgeon, and we pegged-down the machine in the most sheltered spot. Among his other interests, Mr. Vidgeon is the representative of the Vacuum Oil Company, and although he has a station on the mainland his headquarters are on Thursday Island, which used to be the centre of a flourishing pearl and pearl shell industry. He had brought me over supplies of fuel and oil, and I spent the next day in preparing the machine for the crossing to New Guinea. This involved a good deal of work in getting rid of the dust which had adhered to all parts of the machine and found its way through the engine cowling and into the cabin.

There was no opportunity of getting into communication with the outside world, as we were unable to go to the cable station, which would have taken half a day to reach on foot. Before landing, however, I had located and flown over it so as to let them know I had arrived.

Over the Sea

HAVING spent a very interesting day with Mr. Vidgeon and his friends, whose kindness I shall long remember, I took on a full load of petrol for the 400-mile sea crossing to Port Moresby in Papua. Faced with a strong E.S.E. wind, I found the take-off quite easy. As the wind tended to increase I allowed a bit more than was, perhaps, necessary for the north-westerly drift, and aimed to strike the coast to the south-east of my objective rather than drift too far to the north of Papua.

After flying about a hundred miles, one comes to the Great Barrier Reef, which runs for some thousands of miles. Before reaching this reef one passes numerous coral islands and sunken reefs, which are just awash or covered by only a few feet of water. It is easy to see how islands that may at one time have existed sink below the surface when the coral dies and goes through a period of regeneration; this may explain why certain of the islands marked on the maps of Eastern Australia are not to-day in evidence, or are only exposed at the lowest tides. In some cases I could see the outline of a coral formation which represented the shape of what was probably once an island with vegetation growing on it. After crossing the Great Barrier Reef one passes another reef about fifty miles farther on, which takes the form of a Wellington boot, and is appropriately known as Boot Reef.

Continuing, I soon sighted the high mountains of Papua, which rise to 15,000 ft. or so, and eventually made the coast a little to the south of Port Moresby. Turning north, I soon saw the landing ground, a two-way strip, with a "Fox Moth" standing on it. I landed, and found this to be one of the Guinea Airways' machines.

Private Flying

FROM THE CLUBS

Events and Activity at the Clubs and Schools

CAMBRIDGE

Marshall's Flying School and the Cambridge Aero Club have given 19 hours' dual during the past week. Despite high winds, snow and sleet, two long cross-country flights were made. Ten members of the Civil Flying Corps attended on Sunday.

BRISTOL

The Bristol and Wessex Aeroplane Club has received Air Ministry approval for giving blind flying instruction to pilots holding "B" licences and for the renewal of their licences. Instruction may also be given to candidates for "B" licences. The charge for blind flying instruction is two guineas an hour.

There are two new "pilot" members, Dr. G. E. Pepper and Mr. H. M. Styles. Col. and Mrs. Cooper and the Misses B. E. and C. M. Bennis, Mrs. R. W. Barton, and Messrs. F. Tyrwhitt Drake and J. S. Barnfield have become "ordinary members."

CINQUE PORTS

Two of the club ground engineers are taking instruction with a view to acquiring "A" licences in accordance with the club's policy that all members of the staff should be licensed pilots.

Mr. Tyson, flying the Airspeed "Envoy" with which he has made a demonstration tour of India, called at Lympne one day last week, and said that he had seen Capt. Duncan Davis and Mr. "Ken" Waller in Athens the night before.

New members joining the club are Messrs. V. H. Hodgson (who for several nights has tried to do his "B" licence "cross-country," but has been beaten by bad weather), T. G. Ingram, J. M. Marshall, and R. J. B. Seaman.

Flying times for the week, dual and solo, amounted to 34½ hours.

HANWORTH

Hanworth has accepted Reading's challenge to a "Dawn Patrol" on Sunday, April 14. Nearly all the club machines have been booked by members, and quite a number of privately owned aircraft will take part. A landing competition between Reading and Brooklands was held during the week-end, and arrangements are being made for a similar competition, under the "Hart" rules, to take place between Manchester and Hanworth at Manchester in the near future. A tour to Paris during the Easter holidays is being organised.

A total of 34 hours was flown last week in spite of bad weather. Messrs. F. Hayes and M. John passed their "A" licence tests, and Messrs. C. G. Pountney and J. Charsley have renewed their "A" licences. New members include F. T. Lett, C. A. Wrench, and L. Falk.

GETTING TOGETHER: Capt. J. C. Hargreaves, Mr. L. P. Hirsh, of Airports, Ltd., Mr. E. W. Percival, designer of the 1935 "Gull" seen in the background, and Mr. R. L. Preston, snapped at Heston recently.

LIVERPOOL

High winds and generally bad weather conditions have allowed only 38 hours' flying during the week. During March 187 hours were flown.

YORKSHIRE

The Aviation Group Scheme continues to progress, and ten members of the Group have started their flying course at Yeadon.

Thirty-four hours were flown on club aircraft during the past week, and flights were made to Lincoln, Manchester, and Liverpool. Mr. S. G. Beaumont, of Wakefield, has joined the club as a flying member, and Mr. A. C. Mayne, of London, has become a temporary member.

HATFIELD

Flying by the Royal Air Force Flying Club has been considerably curtailed owing to the fact that some of its machines are undergoing repair. Should these have been in commission, however, the cold and exceedingly unpleasant weather would not have tempted members to fly.

Despite the weather conditions 54 hr. 20 min. flying has been recorded by the London Aeroplane Club. New members are: Messrs. N. Alexander, P. J. S. Boyle, H. R. Freemantle, J. G. Hopcraft, F. C. J. Hughes, and H. S. Stern.

TOLLERTON

On March 30 the Lord Mayor and Lady Mayoress of Nottingham made their first flight. This was from Hatfield to Tollerton in one of Capt. Olley's "Rapides," flown by himself.

There was one cross-country flight, this being made with two passengers to the Grand National. Four club machines visited the Leicester Aero Club for lunch on Sunday.

During the past week 14 hr. 10 min. was flown on club machines. There is one new flying member, and one associate member. Twenty-two machines visited the aerodrome.

MIDLAND

Flying times last week were 8 hr. 25 min. dual and 8 hr. 5 min. solo. Visitors included Messrs. Holland Martin ("Leopard Moth"), Guy Robson ("Leopard Moth"), Mr. Razik ("Puss Moth"), Mr. Crawford ("Avian"), Mr. Wynne Eaton (Klemm), Mr. Cave, Mr. Attwell ("Moth"), Mrs. Barnes ("Hawk"), and Mr. Halkett. New members include Mr. M. Desmond and Miss Rosemary Deddoes. Cross-country flights to Braunstone and Sywell have been made.

During March 143 hr. 40 min. were flown, and the total flying time for the year ended March, 1935, was 1,485 hr. 25 min.

NEWCASTLE-UPON-TYNE

During March two air line pilots, one from Aberdeen and one from Jersey Airways, Ltd., visited Cramlington to take an instrument flying course. Both these gentlemen qualified for a certificate in accordance with Air Ministry requirements for Category "B."

The opening of the new Municipal Airport at Woolsington has been arranged for Friday, July 26, 1935. Lord Londonderry will perform the opening ceremony, and on that and the following day a flying display will be given. It is proposed to hold the London-Newcastle Air Race on Saturday, July 27.

During March 167 hours were flown. Instrument flying instruction amounted to 16 hr. 30 min.

NORFOLK AND NORWICH

Mr. Harold Birchall, of Taunton School, the originator of the Public Schools Aviation Camp scheme, has been making preliminary arrangements for the camp to be held in August. A number of aldermen, councillors, and corporation officials took advantage of the invitation of Crilly Air Lines to fly over the city. On Tuesday, April 2, this company made its inaugural flight to Bristol.

Mr. Maurice King has purchased a "Moth." Sqd. Ldr. Carnegie visited the club in a "Hart" from Uxbridge.

On Monday, May 6, the club will commence a programme arranged for Jubilee week. On this day club and privately owned machines will make a formation flight over the city, following the route of a procession which is now being organised. After lunch there will be competitions for the pilots, and joy-rides for the public, and afterwards a tea-dance will be held in the clubhouse, followed by a supper-dance in the evening. On Saturday, May 11, Jubilee Air Displays, led by Lt. O. Cathcart-Jones, will give a display, and on Saturday, May 25, which is Empire Air Day, the aerodrome will be open to the public.

Private Flying

READING

Brooklands Aero Club scored another win over Reading in the third of the series of friendly landing competitions between the two clubs, the "prize" for which is an extremely ancient pint tankard! This match took place at Hanworth aerodrome.

The Brooklands average (in feet) from the centre of the circle was 43 against Reading's 52, and the individual placings were: 1, Mainwaring (B.); 2, Kitley (B.); 3, Bishop (R.); 4, Morris (B.); 5, Armitage (R.); 6, Miss Ruth Fontes (R.).

The first Dawn Patrol of the season will take place, weather permitting, next Sunday between the times of 8.0 and 8.30 a.m. under the usual rules.

REDHILL

During January, February and March at the B.A.T. School of Flying and Redhill Flying Club the flying times were 79 hr., 101 hr. 45 min., and 214 hr. 10 min. respectively. Messrs. J. H. G. MacArthur and O. Pritchard made first solo flights, and Mr. J. Dade obtained his "B" licence. The following completed their blind flying course for the "B" licence: Mr. Holland, of the Hull Aero Club, Mr. Philips, of Cornwall Aviation, Mr. R. Price, of Imperial Airways, Mr. J. Sale, Mr. J. E. D. Scott, and Mr S. W. A. Scott, of Provincial Airways. Mr. M. Houdret went solo on the Autogiro, and Messrs. Bliss and Wilson have started their blind flying course.

A number of private owners and the "Cruiser" from Cowes have sought refuge at Redhill when fog conditions have been in force at Croydon.

During the week ended April 5 44 hr. 40 min. were flown. Mr. Wilson completed his blind flying course, and Mr. T. G. Jackson made his night flight from Lympne to Croydon. Mr. Larmuth also undertook some night landings at Croydon.

RANGOON

During February the flying time of the Rangoon School amounted to 72 hr. 5 min. This is a decrease compared with last month's figures, the drop being due mainly to the fact that the "Fox Moth" has done less joy riding.

Messrs. L. H. Drake, H. I. Fisher, and R. Jackson have joined the School, and Mr. A. F. L. Thesiger has rejoined after leave in England. Sixteen pupils flew during the month, and three made cross-country flights. Lady Stephenson, wife of the Governor of Burma, has visited the Club on several occasions, her pilot being Capt. Sinclair, A.D.C. to the Governor. Capt. Sinclair learned to fly at Rangoon.

Two charter flights have been made, one of them to Minhla where the inhabitants laid out an aerodrome for the occasion. The other, the first of its kind in Burma, was made to Ganein. The Phoongyis of Ganein chartered the "Fox Moth" for carrying round the district the embalmed body of a Phoongyi. About 10,000 people were present. Joy riding was attempted, but had to be abandoned, a strong force of police and Phoongyis being inadequate to control the crowd.

BROOKLANDS

Mr. Smallman, the social secretary, who was a war-time pilot, is taking his "A" licence. He has not flown since the war, but went solo after only two hours' instruction.

New pupils this week include Miss Caldwell and Mrs. Mitchell, Messrs. Atlee, Mitchell and Nightingale, and Dr. Whitehouse. Mr. Scott has completed his blind flying course.

HERTS AND ESSEX

Owing to the bad weather experienced flying was only possible on three days last week. The totals were: Dual, 16 hr 15 min., and solo, 11 hr. 45 min.

The Club has just produced a neat competition handbook which gives particulars of all the competitions, the dates on which they will be held, and the present holders. All pilot members of the Club will receive a copy. The result of "55 Squadron Cup" Competition was as follows: 1, D. C. Mason; 2, S. Dack; 3, P. C. Bromwich.

NORTHAMPTONSHIRE

Although flying was seriously hindered at Sywell during the early part of last week by gales and snowstorms, Sunday—the day of the Club's "Opening of the Season" Display—proved to be a fairly fine day.

In spite of slight showers early in the day a large crowd turned out to watch the show and enjoyed an interesting and varied programme. This included aerobatics by the Club's chief instructor, Mr. E. C. Goldsmith, piloting an Avro "Cadet," and by Mr. G. E. Lowdell, test pilot for Wolseley Motors, piloting a Hawker "Tomtit." Amongst the machines demonstrated were the Klemm "Eagle" and "Swallow," and the Miles "Hawk." A display of converging bombing was one of the high-lights of the afternoon. Pilots taking part were Messrs. G. and J. Linnell, Charles Hayne and E. C. Goldsmith. Among the visitors were Lord Willoughby de Broke (President of the Club), Mr Lindsay Everard, Mr. R. O. Shuttleworth, and Air Vice Marshal Chamier.

BENGAL

H.E. The Governor of Bengal presided at the Club's annual Inauguration Gymkhana on February 10. The main item was a display of aerobatics by Mrs. I. J. Lewis and Mrs. Knocker, wife of the pilot instructor. These ladies put up a very polished performance. Flt. Lt. Knocker did crazy flying and balloon bursting, and co-operated with Ft. Lt. Harris and Mr. H. I. Matthews in some excellent formation flying. Mr. Matthews, incidentally, won the cross-country flight, general flying, and map reading competitions. The landing competition for juniors was won by Mr. A. S. M. Ali Ashref, the obstacle race by Dr. H. Rahim, and the height and speed judging competition by Mr Kenjilal.

The flying return for the month showed a total of 91 hr. 30 min. Mr. D. D. Sarawgi commenced taking instruction, and Mr. S. M. Acharjya made his first solo flight.

In Tasmania

At the recent annual meeting of the Tasmanian section of the Australian Aero Club it was reported that a record had been established last year in that club machines had flown 989 hours. During the year eleven pilots obtained "A" licences.

Airman of Aran

The Aran islands, made famous by Mr. Robert Flaherty's film, "Man of Aran," were visited by an aeroplane for the first time recently. Mr. E. J. Dease, instructor of the Cork Aero Club, flying a Klem "Swallow," was on a visit to Galway, and after landing at Oranmore took off and successfully landed on Aran itself, near the village of Kilronan. As there are no fields big enough he was forced to use the beach.

Commercial Air Travelling

According to the *Rand Daily Mail* a South African wholesale firm, J. W. Jagger and Co., is using a Waco cabin biplane to carry samples over Northern Rhodesia and between Buluwayo and Lake Ngami The machine should show a really useful saving of time when compared with motor transport. It will be kept at Germiston and will be piloted by Mr. R. W. Ashby, of the firm, with Capt. J. Douglas Mail as temporary technical adviser during the early operations. This progressive firm, incidentally, was the first to use motor transport for 'soft goods."

Ireland's Aviation Day

Last year the Irish Free State's Aviation Day had to be abandoned owing to the Dublin newspaper strike. This year, however, May 11 has been selected for this event, which is to take place under the auspices of the Irish Aero Club in the Phœnix Park, Dublin. The Free State Army Air Corps is putting up a display, and Sir Alan Cobham's circus, which will be in Ireland from May 4 until May 23, is co-operating with the club. Sir Alan's team is also to give a display at Leopardstown, County Dublin, where the first flying meeting ever held in Ireland took place in 1911—curiously enough on May 12.

An Air Race to the Isle of Man?

Plans for an air race from Woodford aerodrome to the Isle of Man on Whit Saturday, June 8, and for a pylon race round the island on Whit Monday are, it is reported, being made by the Douglas Corporation in collaboration with the Royal Aero Club. The intention is that both events would prove a Whitsuntide holiday attraction, and that the first would popularise air transport between Lancashire and the Isle of Man by awakening the interest of the public.

The first race will be over a 160-mile course from Woodford to Ronaldsway, and the course will include Liverpool, Blackpool, Southport, St. Bees Head (Cumberland), and Maughold Head (Isle of Man). The sea crossing from the mainland to the island will thus be about 35 miles. The second race will be a handicap event, consisting of three laps round the island.

AN AMERICAN "RADIO COMPASS"

The Kreusi Type, which is the Key Unit in the U.S. Army Air Corps Blind Landing System

THE main claims advanced for the Kreusi "radio compass," manufactured by the Fairchild Aerial Camera Corporation, are, first, that it operates as a homing device, utilising the normal transmissions of commercial broadcasting stations in addition to those intended primarily for the assistance of aircraft; secondly, that it can be operated at all times as a position finder; and, thirdly, that it is an aid in making a safe approach to an airport under unfavourable weather conditions.

In order to use the instrument as a direction finder the pilot first tunes in on a station at or in the direction of his destination. He accomplishes this tuning by means of earphones and a handle which adjusts the frequency dial. From the headphones he switches to a bearing indicator, the position of the pointer of which, in relation to "zero," indicates the direction of flight in respect to the desired course.

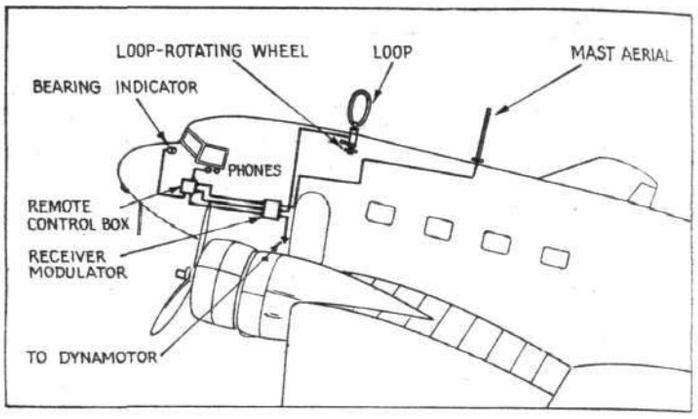
To use the instrument as a position finder, with a fixed loop, the pilot selects a station to one side of his course, tunes in, brings the bearing indicator pointer to "zero," and takes a bearing from the magnetic compass or directional gyro. This process is repeated on another station, and the machine then returns to its course. The two cross bearings are plotted on a map, and the point of their intersection indicates the position of the aeroplane.

A Rotatable Loop

If a rotatable loop is used it is not necessary that the machine be deviated from its course. In this case the loop is turned by a hand wheel at the base of a tubular connection projecting inside the aircraft below the loop mounting. Associated with this wheel is a scale from which the bearing can be quickly read. Cross bearings can be secured on the ground by rotating the loop in the above manner or, if a fixed loop is used, by detaching it from the mounting and turning it by hand. Drift readings are obtainable by a comparison of the radio compass readings with the magnetic compass.

Another claim is that the new radio compass has a longer range than the beacon receivers, and can be relied upon in "static" disturbances which render useless all other means of radio navigation. Satisfactory bearings may be received, under average conditions, at a distance of 300 miles over land and 700 miles over water. Under favourable conditions bearing indications have been obtained over 1,500 miles. Aural signals can be received by turning a switch which cuts off the compass unit.

The direction finder covers the frequency range of 150 to 1,500 kc. (2,000 to 200 metres). Changing from one band to the other is accomplished by remote control. The sensitivity of the compass is such that when both the standard mast aerial and the loop aerial receive a signal of the order of five microvolts per metre over the frequency range of 150 to 1,500 kc. a maximum deviation of 2 deg. to either the left or the right of that position of the loop at which "zero" indication is received renders a corresponding left- or right-hand deflection of $\frac{1}{8}$in. on the bearing indicator.



This diagram shows the layout of the Kreusi radio compass components on a typical commercial aircraft — the Douglas D.C.2.

When holding a "zero" bearing on a station the indicator deflects to the right when the aircraft swings to the right. When holding a reciprocal bearing (or a 180 deg. bearing) the indicator deflects to the left when the machine's course swings to the right.

All tuning and switching is accomplished from the remote control box. The tuning dial is calibrated in kilocycles, with illumination of only that frequency band which is being used. Switches are provided for turning the receiver or direction finder on and off, and to select either manual or automatic volume control.

The filament voltage is supplied from the twelve-volt starter storage battery, and the plate supply is obtained from a dynamotor operating from the starting battery.

The Bearing Indicator

The bearing indicator is mounted on the instrument panel of the aeroplane and is so designed that the pointer moves smoothly and regularly throughout the instrument's scale range regardless of the inclination of the aircraft. It is of the iron-core dynamometer type with a total movement angle of 70 deg. and a sensitivity of 100 microamperes at full scale.

A laminated ash loop of streamlined cross section, and 21in. in diameter, supports the loop turns. It is claimed that it has a drag not over 8lb. at 250 m.p.h.

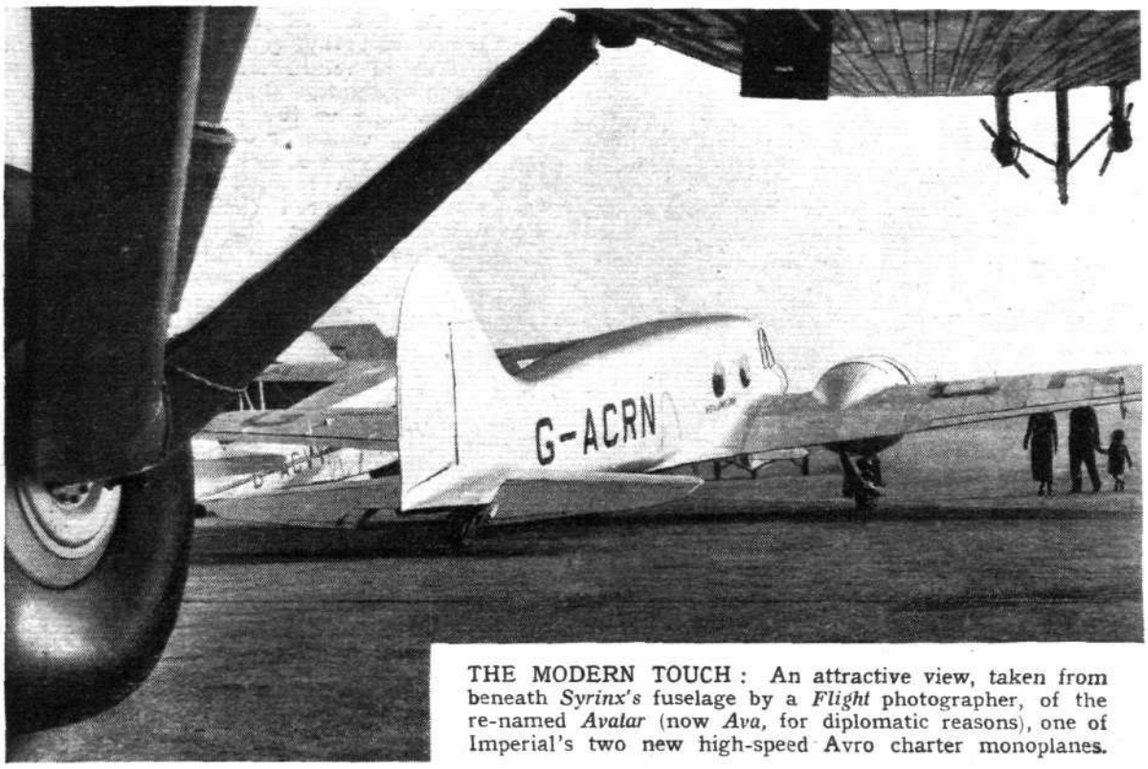
A rotating mechanism turns the loop aerial through 360 deg., and it is possible to lock the loop in any position at air speeds up to 250 m.p.h. A 360 deg. scale readable to 1 deg. is provided for the rotating mechanism, which embodies a large hand wheel. Fine adjustment of the azimuth scale setting is effected through a Vernier drive mechanism.

The compass receiver unit is $9\frac{1}{16}$in. wide, 8in. high, and $12\frac{3}{8}$in. long. It occupies approximately 1,000 cu. in. and the weight is approximately 45 lb.

ETHYLISED: The "Dragon Six" which the Ethyl Export Corporation has just taken over for work in Europe and the East. The "Gipsy Six" engines have special aluminium cylinder heads with steel valve seats and Stellited valves, to enable advantage to be taken of the widespread supplies of leaded fuels of high octane value. The cabin is luxurious and the machine is finished in black and yellow. Mr. D. W. Lucke is the pilot.

COMMERCIAL AVIATION

— AIRLINES — AIRPORTS —



THE MODERN TOUCH: An attractive view, taken from beneath *Syrinx's* fuselage by a *Flight* photographer, of the re-named *Avalar* (now *Ava*, for diplomatic reasons), one of Imperial's two new high-speed Avro charter monoplanes.

CROYDON

Token Transference by K.L.M. : A Journalists' Tour of Europe : An Egyptian Occasion : Fast Refuelling

THE chief interest of the week at Croydon was centred round the K.L.M. gold rush last Friday and Saturday. Altogether twelve special machines, fully loaded with bullion, English sovereigns and American gold dollars, arrived at Croydon from Holland. Moreover, every service machine, and there are four each way daily, carried as much bullion as a brisk passenger traffic would allow.

So great was the call on the company's fleet that two machines, the big F.9 and an F.12, left Amsterdam at 10 p.m. on Friday with more bullion, arrived here about midnight, and turned straight round to go back, flying both trips during darkness in order that the machines should be available again for day services. None of the machines was on the ground in England for more than about half an hour.

Altogether K.L.M., in a couple of days, brought seventeen tons of gold into this country, the value of which would be little short of three million pounds. Incidentally, it is queer that during this intensive rush of gold to England, there was a small consignment which went out from Croydon to Holland!

During the week Olley Air Service, Ltd., carried 230 employees of Bon Marché, Ltd., on short flights. Two "Rapides" and a "Dragon" were employed, and it took a little over two hours. More of these day outings of employees are to be spent at Croydon in a similar manner.

A number of journalists have been making a lightning tour of Europe by various air lines. At Croydon they have been welcomed and entertained by Imperial Airways, Ltd. So far, Press representatives from Denmark, Germany, Switzerland, Austria, Holland, Czecho-Slovakia and Poland have arrived, and others, including an Italian pressman, are to come.

On Saturday, April 6, the red carpets were down and potted palm trees gave the main hall an exotic beauty. The occasion was the visit of the Egyptian Mission of Economic Enquiry, led by His Excellency Hafez Afifi Pasha. The delegates made a flight over London in *Syrinx*, and were received at the airport by Lieut.-Col. F. C. Shelmerdine. A number of interesting aeroplanes were on view, including an Autogiro, an Armstrong-Whitworth "Scimitar," a "Rapide," a "Dragon," a Saro "Cloud," an "Envoy," a Short "Scion," and the new Spartan "Cruiser" Mark III for Spartan Air Lines, Ltd. This machine, which will be used on the Croydon-Isle of Wight route, is an eight-seater with a crew of two, has a monocoque fuselage and spatted wheels. It is credited with a cruising speed of 120 m.p.h. and with an improved take-off. Amongst other interesting features is a genuine parquet floor to the cabin.

Last Sunday the big four-motor K.L.M. F.36, piloted by Cdr. Sillevis, came in to Croydon with twenty-five passengers. The machine has a pantry and carries a steward It will be used between London and Berlin during the summer, arriving every night at 10.50 p.m. and leaving again at 7 a.m. for Amsterdam and Berlin.

Considerable speeding up of tarmac refuelling is a boon we notice in hectic periods such as that caused by a gold rush or during holidays. The Shell aircraft service vehicle can pump sixty gallons of petrol into a machine in two minutes, so that instead of having to taxi to a fuelling point, fill up and taxi back—taking thirty minutes over the job—the whole thing can be done in five minutes and luggage and freight can be loaded at the same time.

A. VIATOR.

Night Landings at Cardiff

With their new G.E.C. shadow bar equipment, Cardiff has now an airport which is among the select few capable of being used for serious night work When Whitchurch is equipped Western Airways will be able to operate their ferry service until midnight or after.

Commercial Aviation

THROUGH TO BRINDISI

Imperial Airways to Run a Twice Weekly Service to Rome and Brindisi : Empire Service Arrangements Unaltered

FOR some time it has been known that an arrangement had been reached whereby Imperial Airways, Ltd., were to be permitted to fly through to Brindisi. Reservations, of course, there were, and in any case Imperials were not in a position to carry both passengers and mail through for Africa and the East. Service duplication, for instance, has meant that every single machine of the necessary capacity is being, if anything, overworked on the other sections. However, this is the first step.

From April 28 to September 30, inclusive, D.H. 86 machines (the "Diana" class) will leave London for Marseilles, Rome and Brindisi on Sundays and Thursdays, and will leave Brindisi in the reverse direction on Wednesdays and Saturdays. The outward times will be: Croydon, 06.00; Paris, 07.55; Marseilles, 11.45; Rome, 15.05; and Brindisi, 17.45. The return times will be: Brindisi, 06.00; Rome, 08.55; Marseilles, 12.30; Paris, 16.05; and Croydon, 17.45.

Only passengers and freight will be carried, and the question of whether homecoming passengers from India, Australia and Africa can be accommodated will depend on the bookings on this service itself. In other words, this service can be considered as being separate and quite distinct from the Empire services, passengers from which will be able to travel thereon rather as a special favour.

The reservations are easy to understand. Passengers may book from London to Paris, to Rome or to Brindisi, from Paris to Rome or Brindisi, from Marseilles to Rome or to Brindisi, and *vice versa*. International "cabotage" laws naturally prevent us from carrying passengers between either Paris and Marseilles or between Rome and Brindisi. Air France carry a useful load between London, Paris and Marseilles in connection with the steamers which call at the latter port, and, naturally enough, ask a favourable "pool" arrangement in return for permission to book passengers between those points. Imperials, therefore, have agreed not to take bookings for this particular section.

All the sections are of the medium long-distance variety—the longest, between Paris and Marseilles and Marseilles and Rome are some five hundred miles in length—and in order to deal with possible head winds the D.H. 86s are sufficiently heavily loaded with fuel to make passenger accommodation limited. Actually six seats only are to be provided, with an ample margin for luggage and freight. The comparatively fast "Dianas" are essential, in any case, if the trip is to be carried out comfortably in a day's flying. Incidentally, Imperials will, by the time this service is opened, have five of this type.

The fares are: London-Rome, £18 single, and £30 12s. for a fifteen-day return; and London-Brindisi, £23 and £39 2s. respectively.

Meanwhile the project of a daily service between Rome and London, sponsored by Ala Littoria, is still being examined. Savoia-Marchetti S.74 four-engined monoplanes are to be used and the projected route passes over the Alps.

The Thames Ferry

When Southend Flying Services, Ltd., re-commence operations it is probable that Gravesend airport will be included in the ferry service between Rochester and Southend. The company, which, of course, operates in conjunction with Short Bros., now have the use of two Short "Scions."

A K.L.M. Disaster

In the tragic accident, which occurred to the K.L.M. Prague-Rotterdam machine last Saturday, the company lost one of its most brilliant pilots, M. Soer. The machine hit a hillside near Brilon, Westphalia, while flying in a heavy snowstorm. Soer has made seventeen flights to Batavia and back, and was with Smirnoff in the *Pelikaan* when, in December, 1933, he flew from Amsterdam to Batavia in four days.

At Heston

The 200-foot 47-ton girder which will shortly span the entrance to the new workshop hangar at Heston was, at the time these notes were being written, about to be hoisted into position. Two hand derricks, each manned by six people, provide all the power required to raise into position the largest girder to be used in any building in England. The steelwork, from Dorman and Long, of Middlesbrough, was fabricated by Boulton and Paul, the constructors of the hangar, and brought to Heston from Norwich in thirty-four pieces.

The M.B.1 experimental monoplane, powered with a Napier "Javelin," which is the first product of the Martin-Baker Aircraft Company, passed successfully through its first flying tests at Northolt last week, in the hands of Capt. V. H. Baker. It is understood that this machine will not be put into production, but will be used solely for experimental work. Its unusual system of construction was described in *Flight* of December 20.

The first Miles "Merlin" is to be delivered in about three weeks' time to Birkett Air Service, Ltd. Delivery is awaiting the installation of a Ratier variable-pitch airscrew. This particular "Merlin" is to have a stretcher attachment. Extra tanks will give the machine a cruising range of ten hours.

A six-wheeler aerodrome petrol tender was demonstrated to representatives of the Air Ministry by the National Benzole Co., Ltd., at Heston on April 1. This is the first power-driven petrol tender to be produced by the company, and it has a capacity of 800 gallons and a delivery rate of 25 gallons a minute. While speaking of refuelling, it should be mentioned that the new car filling station has now been opened at the airport entrance.

B.A.N.Co.'s Plans

In last week's issue the British Air Navigation Co.'s plans were briefly recorded. It appears that quite separate services will be run from Heston and from the new aerodrome at Brighton. From the former summer services will be operated to Le Touquet, Dieppe and Deauville, and from the latter to Deauville, Le Touquet and Paris. In due course, the new aerodrome, where levelling work is now almost complete, will be equipped for night landings and with radio.

Alternative Airport Number One

The first stones for the new Southern Railway station at Gatwick have been laid and work on the control buildings should be starting very shortly. It is proposed to equip the airport with complete electrical night landing facilities, and the Air Ministry, one hears, are to experiment with a short-wave radio beacon.

Meanwhile, London and Continental Airlines, who were to operate an hourly service to Paris from Gatwick, will remain dormant at least until the airport is ready.

The New Zone System

The new control zone system, details of which we have not previously been permitted to publish, has now been arranged. As expected, Heston radio station, which will work on 862 metres, will control a large area bounded by the boundary of the London-Continental airway area, and by lines joining Clacton-on-Sea, Bedford, Leicester, Oxford, Bristol (Whitchurch), Midhurst, Selsey Bill and Newhaven.

It will be seen that Heston will control entry into Essex Airport, and that the area covered is very considerable. Portsmouth, working on 862 metres, will take the area lying south-west of these lines and including the Channel Islands. Heston and Portsmouth will work together only for giving "fixes" to aircraft over the Channel west of the line Newhaven-Dieppe and east of the line Selsey Bill-Cape Barfleur. A radio and D/F station has been established in Jersey, working on 862 metres, so that Jersey Airways pilots will be led by the hand in bad weather.

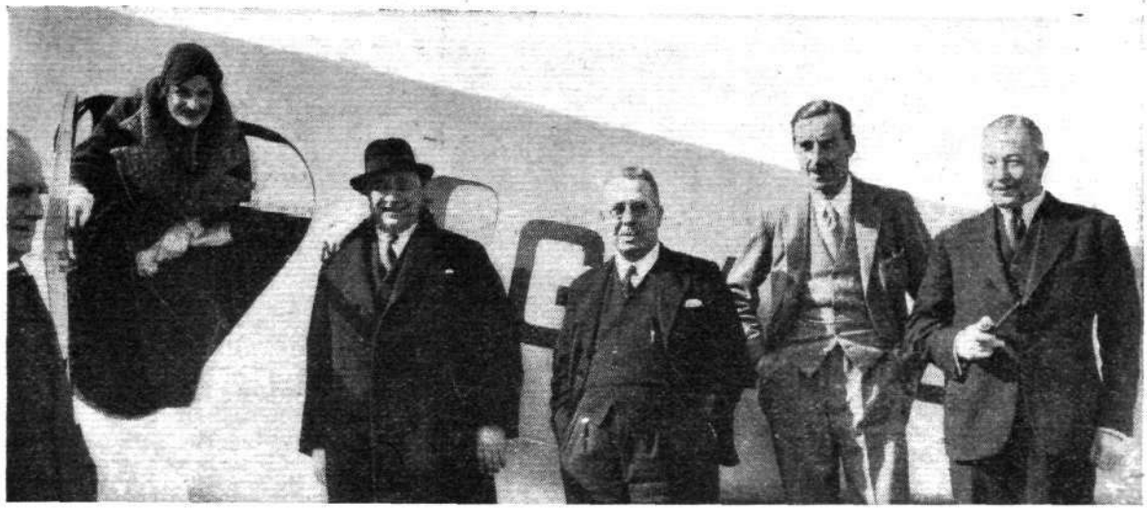
The R/T wavelength of Croydon, Lympne, and Pulham has been changed from 862 metres to 825 metres, while the ordinary and special W/T wavelengths for transmission and reception remain unaltered.

This new scheme will certainly relieve Croydon, whose control officer will deal exclusively with the London-Continental airway area. Incidentally, Portsmouth will no longer co-operate with Croydon in the matter of "fixes."

Commercial Aviation

THE NORTH-EASTERN ROUTE

Mrs. Anthony Eden Christens the First "Envoys" for North-Eastern Airways.



The "Envoy" at Heston. From left to right can be seen Col. Boyle, Mrs. Anthony Eden, Ald. W. Hemmingway (the Mayor of Leeds), Ald. F. H. O'Donnell, Lord Grimthorpe (Chairman of North-Eastern Airways) and Col. Cameron.

ON Monday, North-Eastern Airways, Ltd., whose plans were outlined in the issue of March 14, inaugurated their service between London, Leeds and Newcastle with the requisite pomp and circumstance. Two Airspeed "Envoys" had flown up to Yeadon on the previous day, and at 11.15 a.m. all was in readiness for the christening ceremony, which was ably carried out by Mrs. Anthony Eden in the presence of the Mayor of Leeds and of Lord Grimthorpe, the chairman of the company. The first two machines were named *Tynedale* and *Wharfedale*.

The services were carried out more or less according to plan. One machine carried Admiral Sir Cyril Fuller and Mr. R. Somerset, the managing director, to Newcastle (Cramlington for the time being) and the Mayor and Mayoress of Newcastle to Edinburgh (Turnhouse for one day). The second machine, carrying Mrs. Eden, the Mayor of Leeds, Lord Grimthorpe, and sundry other notables, flew up to Heston, where lunch was given.

It was rather unfortunate that after a perfectly good landing, perhaps rather far up the airport, this machine should have run gently into the fence on the south side of the new hangar. Actually the surface of Heston was just about as greasy as it could have been, and the pilot's gentle application of brakes, sufficient under normal circumstances, merely caused the "Envoy" to slide slightly broadside with the tail track well outside the wheel tracks. However, very little damage was done.

Permission to use Turnhouse aerodrome had, unfortunately, only been obtained for the single day, so presumably the service will stop its journey on each day at Cramlington until such time as Edinburgh sees fit to have a useful municipal aerodrome.

In a week's time Heston will have D/F facilities, but the pilots are virtually without help in the north, though each "Envoy"—three will shortly be in service—carries Standard radio equipment, and Yeadon is connected by landline to Barton, where radio facilities are available. Hedon, Hull, too, will have its mobile D/F equipment in due course, if this has not already been returned. When the new airport at Woolsingham is complete radio may be available there.

The pilots are: R. J. Barrett, V. J. Wheeler (late of Wilson Airways, East Africa) and H. W. Easdown (late of Hillman's). All the maintenance is being carried out by the company's own engineers.

North-Eastern Airways are considering the possibility of running a special series of services to Hamble at Easter for the benefit of London yachting enthusiasts, and this idea may be extended if it proves sufficiently popular.

The Zeppelin Service

The *Graf Zeppelin* left Friedrichshaten on its first South American trip on April 6. The fare to Rio de Janeiro is RM.1,500, which sum includes all gratuities and so forth, and the service is operated fortnightly.

Towards the end of the summer the L.Z.129 will make a few trips to Lakehurst at an inclusive fare of R.M.1,250.

The Torquay Aerodrome

Provincial Airways' new aerodrome at Denbury was officially opened by the Mayor of Torquay, Mr. A. d'Espiney, last Saturday. There were the usual exhibitions of aerobatics, crazy flying and parachute jumping—pleasant for the visiting public, but hardly, perhaps, giving them the right idea about airline travel!—and joy flying continued throughout the day. Incidentally, there was a very fair turnout of private aircraft, and the rather inevitable meeting of the National League of Airmen, at which an address was given by Capt. Macmillan. We must learn to separate airline operation, sporting flying, and air defence.

Bristol to Le Touquet

As foreshadowed in *Flight* in December, Western Airways, Ltd., will run a special week-end service from Bristol to Le Touquet during the Easter holidays. The return fare is £6 15s., and machines will leave Whitchurch on Thursday and Friday at 4.30 p.m., and on Monday and Tuesday at 2.30 p.m. Incidentally, the Bristol Corporation has decided to build a traffic and booking hall at the airport; this will contain customs and control offices, as well as a waiting room, and should be completed before the end of next month.

Forging the Links

From time to time during the past few months there have been welcome signs of a more wholesale planning of air routes in this country. In last week's *Flight* particulars were given of a new company, United Airways, Ltd., which is to operate between London, Blackpool and the Isle of Man, and of their connection with Whitehall Securities, Ltd., the company behind Jersey Airways, Ltd.

United Airways, Ltd., will, starting tentatively on April 15, run services twice daily between Heston, Blackpool (Stanley Park) and the Isle of Man, D.H. "Rapides" being used for the first part of the journey and three-engined Spartan "Cruisers" between Blackpool and the Isle of Man. It will thus be possible to book from Jersey to the Isle of Man. Later in the season, Northern and Scottish Airways, Ltd., who are also connected with the merger, will be operating between Glasgow, Carlisle and the Isle of Man.

On the other hand, Jersey Airways are collaborating with Railway Air Services in the matter of through fares, and R.A.S., it is rumoured, are planning some interesting extensions to the services operated during last summer. In last week's *Flight* it was announced that they were operating to the Isle of Man, and in so doing they will have the co-operation of both the railways and the Isle of Man Steam Packet Company. Now one hears that Railway Air Services will themselves fly from Southampton to the Isle of Wight and to Portsmouth and Brighton, from Cardiff to Torquay and Cornwall, from Birmingham to Nottingham and also between Liverpool, Manchester, Blackpool and the Isle of Man. All these services, of course, are linked up with or are extensions of their existing services.

Commercial Aviation

Aerodromes for Jaipur

For the construction of an up-to-date aerodrome at Sanganer, four miles from the capital, the Jaipur State Council has recently sanctioned a sum of Rs.100,000. It has also been decided to lay out landing grounds at Sawai, Modhopur, Isarda, Malpura and Jhunjnu, in the State territory.

Safety in the U.S.

According to statistics which have just been published, passenger lines in America flew 592,802 miles per accident during the last six months of 1934. In only four accidents out of forty-six were passengers or crews fatally injured, and "passenger-fatality-miles" totalled more than twenty-six million. This is a distinct improvement on the figures for the same period during 1933.

The First Australian Passengers

Owing to the fact that several sections of the route had already been booked right up, no through passengers to Australia are being taken on next Saturday's "all-air" Australian service. However, two geologists of the Anglo-Persian Oil Company have booked for the second service, which leaves in the following week, and they will, therefore, be the first people to fly from here to Australia by regular service. As recorded in *Flight* of March 28, the fares have been considerably reduced.

Centralisation

The Commercial Aviation Committee, of which Sir Stephen Demetriadi is chairman, and which is representative of the London Chamber of Commerce, the Association of British Chambers of Commerce, and the Federation of British Industries, recently addressed a letter to the Secretary of State for Air on the subject of the organisation of Great Britain's internal airways.

The Committee have had under consideration resolutions adopted by the Liverpool and Newcastle-on-Tyne Chambers of Commerce and by the Air Transport Section of the S.B.A.C., as well as the memorandum which was submitted by the London Chamber of Commerce to His Majesty's Government last August. The Committee were impressed in each case with the importance attached to the necessity for the setting up of a central authority with statutory powers, which should have charge of the planning of internal airway organisation and upon which Government Departments concerned, air transport operators and insurance and commercial interests should be represented.

A scheme has been adopted in India, the Committee understands, whereby the equivalent of the amount of the tax levied on petrol used in aircraft is credited to a special fund and handed over to the Director of Civil Aviation in addition to the ordinary Government grant. There may be some objection in this country to the principle of the financing of a central authority in the manner adopted in India. The Committee, however, have submitted that an annual grant should be made from Government funds to the proposed central authority towards the provision of the necessary airway organisation. This grant, it is suggested, should be reviewed from time to time and should have some regard to the computed yield from the tax on petrol used for the purposes of flying within Great Britain.

Another Douglas for Spain

The Spanish operating company (L.A.P.E.) have taken delivery of the second of their Douglas D.C.2s, to be used on the Madrid-Paris service, which will be opened on May 10. The trip from Paris to Madrid was made last Saturday in 3 hr. 40 min.

A Monster for Leeds?

According to the *Sheffield Telegraph*, Leeds may be the first city in the world to have a roof aerodrome. Plans are under consideration for the reconstruction of the adjoining L.M.S. stations and hotel in such a manner that the roof area may be extended and arranged as a landing area. One sometimes wonders, however, whether people who talk glibly of roof aerodromes realise the full extent of the area required.

Simplifying Navigation

The G.A.P.A.N. has for some months been endeavouring to interest the Air Ministry in certain recommendations concerning the Second Class Navigator's Examination. During past years many of the questions set have been outside the scope of practical air navigation or have been obscure in their statement. The Guild has recommended that the list of publications on which the examinations are based should be vigorously curtailed, that the waiting period before the results are announced should be shortened, and that failure in one particular subject should not mean that the whole examination has to be taken over again.

At Hatfield

A fortnight ago the very first "Dragon" to be built—to the order of Hillman's Airways—came out of the Hatfield workshops after its C. of A. overhaul. This machine now belongs to Aberdeen Airways.

Mr. Rubin's "Comet" has been painted red and should by now have been flown over to Paris by Mr. Buckingham, to be delivered to the French Air Ministry, with one lucky journalist as payload. Incidentally, Scott's "Comet" has at last returned to Hatfield after its arduous tour by surface transport.

Another D.H. 86, named *Draco*, has been delivered to Imperial Airways, and was in regular service on the Budapest route on the following day. Capt. Olley has also collected a new "Dragon" for the Isle of Man service, and Aberdeen Airways has ordered another "Dragon." Misr Airwork, too, have ordered a D.H.86.

A Peaceful Conversion

The big Farman 220 bomber, with four 600/638 h.p. Hispano Suiza engines, which was described in *Flight* of March 1, 1934, has been modified to suit it for long-range mail-carrying, and will soon be put on the Dakar-Natal (Brazil) service. Fuel tanks in the wings and fuselage, holding 2,000 gallons, will give the machine a range of between 2,500 and 2,750 miles when carrying 660 lb. of postal matter, a crew of five, and a wireless operator. The estimated cruising speed is 137 m.p.h., and the ceiling will vary between 13,120 ft. at the start of the flight and 27,880 ft. when most of the fuel has been used. Using only three engines, the machine will fly with full load at 4,920 ft., and, during the last half of the flight, will be able to maintain height with two engines on one side out of action. Official tests are nearly finished, and it is expected that the Farman will fly to Dakar within a few days as a "try-out."

Forthcoming Events

Club Secretaries and others are invited to send particulars of important fixtures for inclusion in this list.

Apr. 11-20. Second Annual Skybird League Rally and Model Competition.
Apr. 15. "Commercial Aircraft." R.Ae.S. Lecture by Capt. G. de Havilland.
May (Date not yet fixed). Wilbur Wright Lecture, R.Ae.S. by Mr. Donald W. Douglas.
May 5. R.Ae.S. Garden Party, Fairey Aerodrome, Great West Road.
May 11. Aviation Day, Phoenix Park, Dublin.
May 19. Deutsch de la Meurthe Cup, Aero Club de France.
May 23. Jubilee Air Ball, Air League of the British Empire, at the Dorchester Hotel, London.
May 25. Empire Air Day, Air League of the British Empire.
May 29. Household Brigade Flying Club. Night-Flying Demonstration, Heston.
June 1. Brooklands "At Home."
June 1-15. Lisbon Aero Show.
June 8. London Aeroplane Club. Garden Party, Hatfield.
June 8. Official opening and garden party, Witney and Oxford Aero Club.
June 15. R.A.F. Flying Club Annual Display, Hatfield Aerodrome.
June 15. Bristol & Wessex Aeroplane Club, S.B.A.C. Challenge Cup, Whitchurch.
June 16. Scottish Flying Club Display, Renfrew.
June 29. Royal Air Force Display, Hendon.
July 1. S.B.A.C. Display, Hendon.
July 13. Opening of Leicester Municipal Airport.
July 20. Opening of Brighton, Hove and Worthing Municipal Airport, Shoreham.
July 28. Private Owners' Garden Party, Ratcliffe, Leicester.
Aug. 24-25. Third International Flying Meeting, Lympne.
Sept. 6-7. King's Cup Air Race.
Sept. 15. Gordon Bennett Balloon Race, Warsaw.
Oct. 12-28. International Aircraft Exhibition, Milan.

FOR the BOOKSHELF

The Flow of War Books Continues : About Airships : Some Useful Handbooks

War in the Air

"Richthofen, the Red Knight of the Air." By "Vigilant." (John Hamilton, Ltd. 7s. 6d. net.)

TWO books have been written about Manfred von Richthofen, one by himself and one by an American, Mr. Floyd Gibbons. The latter was not a perfect example of biography, and a better life of the German pilot could be imagined. There would be justification for a writer who did produce a better book, but there is no excuse for a third biography which is not a marked improvement on that of Mr. Floyd Gibbons. It cannot be said that "Vigilant" has produced a book which is markedly better than the earlier life. The opening passage, which makes a comparison of sorts between von Richthofen and Mr. Mollison, puts the critical reader out of humour with the author, and there is little in what follows to improve the relationship. Some of the photographs which illustrate the book, however, are quite interesting.

"The First War in the Air." By R. H. Kiernan, author of "Captain Albert Ball, V.C., D.S.O.," with a preface by Air Marshal Sir R. Brooke-Popham, K.C.B. (Peter Davies, Ltd., 5s.)

This is very nearly the book for which we have been looking for some time past, namely, a concise history of the war in the air, showing the different phases, and the part played by the technical advances in aircraft, first by one side and then by the other. It is not quite the ideal book of this class, because, although it does tell a good deal about the various epoch-making types of aeroplane, it does not always give the salient fighting qualities of each. It does not explain, for example, that the S.E.5A. could break off a combat by its strength and speed in a dive, whereas the "Camel," though more manœuvrable and desperately quick in a right-hand turn, usually had to stay and fight it out when engaged with Fokker triplanes. Still, though this book might have told us more, it does, in fact, tell us a good deal, and tells it very well indeed.

If it had not been done it would have seemed an impossible task to set forth an adequate history of the war in the air in 188 pages of print. Mr. Kiernan, however, has done it.

"War Flying in Macedonia." By Haupt Heydemarck, translated by Claud W. Sykes. (John Hamilton, Ltd., 7s. 6d. net..)

Few books about the War make really pleasant reading, but this is an exception. Haupt Heydemarck has a happy style, and he has been very well translated. It is an additional attraction that not very much has been written about the Balkan front from the air point of view, and so the reader gets instruction as well as amusement from this book.

Perhaps one cannot pay the author a higher compliment than to say that while reading his book it is almost impossible for the reader not to sympathise with the German airmen on the Drama aerodrome, to rejoice when any of them escapes from peril, and even to exult with them when they shoot down a British aeroplane. The work of the Staffel at Drama was reconnaissance and bombing, but one fighter pilot was attached to it. The hero of the book is Lieutenant von Eschwege, who shot down sixteen British aeroplanes and three kite balloons. Finally he was trapped and killed by a balloon with a powerful bomb in the basket, which was detonated from the ground and destroyed the German fighter.

F. A. DE V. R.

Lighter than Air

"Airships in Peace and War." By Captain J. A. Sinclair (late executive officer, Polegate Air Station). (Rich and Cowan, Ltd., London. 18s.)

The exploits of the German airship *Graf Zeppelin* have provided a striking lesson of what an airship one not of ideal streamline shape, but handled by officers and crew of great experience and skill, can do in the way of safe and comfortable travel across oceans. The war records of the German Zeppelins were also extremely good, so long as they stuck to their proper work of scouting for the fleet, though as night bombers they met more than their match in the aeroplane. The airships of our own Royal Naval Air Service during the war were all non-rigids, and they did fine work in reconnaissance, and particularly as escorts to convoys of food ships, and at a negligible cost in casualties. These facts are too often forgotten by those to whom the word airship means nothing more than the disasters to the *Roma*, *R.38*, the *Dixmude*, the *Shenandoah*, *R.101*, the *Akron* and the *Macon*. All these disasters were due either to inexperience in design or in handling, and not one of them condemns the airship case.

Captain Sinclair is thoroughly justified in making all these points, and in stressing them. He has also written an excellent history of the work of British airships before and during the war, and has told some very interesting stories, most of which have not been published before, so far as the present reviewer is aware. All these sections of his book deserve high praise, and the selection of photographs which illustrate the story has been judiciously made. These photographs add much to the attraction of the book.

In the last chapters the author gives full rein to his bitterness at the official desertion of airships by the British Government. It is easy to understand his feelings, and to sympathise with them, but he certainly overstates his case. Many of his claims can easily be refuted, and not a few of his arguments are positively illogical. Those who, like the author, hope to see Britain return to an airship policy will think it a pity that a good case should be supported by arguments which an able counsel on the other side would find small difficulty in demolishing. Apart from these last chapters, this is quite a good and interesting book.

F. A. DE V. R.

All About It

"The Royal Air Force, Its Organisation, Duties, and Prospects as a Profession or a Trade." By T. Stanhope Sprigg. (Sir Isaac Pitman and Sons, Ltd., 5s. net.)

There are many ways in which a man can serve his country in connection with flying, among them being permanent commissions in the R.A.F., short-service and medium-service commissions in the R.A.F., the R.A.F. Reserve, the Special Reserve, the Auxiliary Air Force, and the Auxiliary Air Force Reserve of Officers. There are various ways of obtaining commissions. There are also various groups of airmen, some being aircraftsmen and some aircraft hands. It all sounds very complicated, until the whole subject is brought together concisely in one small volume, and then it all becomes clear at once. Mr. Stanhope Sprigg has collected all this information and set it forth in 120 pages. He goes into every detail, even to giving rates of pay and pension in the appendices, and the correct forms on which applications must be made.

Philatelic Air History

"BY Air—Through the Stamp Album." By Stanley Phillips. "Stanphil" Stamp Books, No. 1. (Stanley Gibbons, Ltd., 391, Strand, London, W.C.2. 1s. net.)

Stamp collecting, although indulged in by a comparative few, is undoubtedly a very fascinating hobby, but that side of philately associated with air mails provides a much wider interest and appeals to many who are not otherwise interested in postage stamps.

Several "guide-books"-cum-catalogues have been published for those who wish to take up air mail stamp collecting, and these serve their purpose well, but "By Air—Through the Stamp Album" is something new, for it places air mail stamps in a new light. For one thing, even those who have no intention of taking up air stamp collecting as a hobby will find this little book most interesting reading, as it is in the nature of a history of aeronautics told by means of stamps and "covers" carried by air.

For Aeromodellists

"Power-driven Model Aircraft." By F. J. Camm. George Newnes, Ltd., London, 1s.)

On the whole the aeromodellist in this country has not been inundated with handbooks to help him with his hobby, and so far few of the books published have provided much information concerning 'power-driven" models. Mr. F. J. Camm's new book, *Power-driven Model Aircraft*, should, therefore, on this score alone receive a ready welcome, especially as this type of model is growing in popularity

THE INDUSTRY

A NEAT TURN INDICATOR

KNOWN as the type "V," the latest turn and bank indicator produced by S. G. Brown, Ltd., Victoria Road, London, W.3, has its dial divided into two parts. The upper scale and pointer constitute the turn indicator proper, the pointer being in the shape of a small aeroplane in plan view. The movement of this pointer is in the same direction as the nose of the machine to which the indicator is fitted. A pointer working over a scale on the bottom half of the instrument forms the visible part of the inclinometer unit, or bank indicator, as it is generally known. This is a gravity controlled inclinometer with a patented system of air damping which will withstand any vibrations to which the instrument might be subjected. The brass housing contains a Bakelite paddle carried on a hardened steel spindle moving in jewelled pivots. A duralumin pointer hangs downward from the spindle and depends upon gravity for its action. Equal damping at all angles is claimed and the return of the pointer to zero is reported to be lively, but at the same time "dead beat."

The upper pointer of the Brown indicator shows degree of turn and the lower pointer the amount of bank.

The turn indicator mechanism itself consists of a rotor two inches in diameter and spinning at 4,000 r.p.m. Its axis is set horizontally and carried in ball bearings in a frame which is itself fitted with an axis at right angles to, and in the same plane as, the wheel axis, and is mounted in ball bearings in a fixed frame which is part of the body of the instrument. The wheel is so constructed that its mass of weight is around the periphery. The front pivot of the frame in which the wheel is mounted is extended through a graduated card and carries the small "aeroplane-shaped" pointer. On this pivot, behind the card, are mounted the damping pistons working in monometal cylinders. When assembled these cylinders are completely enclosed and are free from dust, as are the bearings, which carry their own lubrication, sufficient for long periods of operation.

A pipe is led in through the body at the back of the instrument and projects upwards under the gyro frame forming an air jet which impinges in serrations on the periphery of the wheel, thus providing the driving power. The outer end of this inlet is fitted with a fine gauze covered screw cap, thus preventing the admission of dust. Above this is the air outlet for connection to the venturi tube, the suction from which draws air through the jet, thus driving the wheel.

Sensitivity is controlled by a spring attached to the frame of the gyroscope, the tension of which can be adjusted by a screw in the bottom of the instrument.

LUBRICATING OIL REFINEMENT

Some interesting details regarding the Vacuum Oil Company's new "Clearosol" process for refining lubricating oil were made public last week. The process consists of treating the crude oil with two solvents, one of which dissolves the wanted, or paraffinic, hydrocarbons, and the other the unwanted naphthenes, olefins and aromatics. The first solvent also precipitates all the asphalt and asphalt-forming substances; these are separated off and the solvent removed from the purified desirable portion of the lubricant, leaving an oil from which all the deleterious constituents have been removed.

The removal in this manner of the tar, gum, and sludge-forming compounds produces an oil which is very low in carbon formation, and reduces gumming of engines to a minimum.

EXACTOR CONTROLS ABROAD

The Exactor Control Co., Ltd., of Dorland House, Lower Regent Street, London, S.W.1, state that they have disposed of the manufacturing rights of the Hele-Shaw Beacham Hydraulic Control—which has been fully described in *Flight*—in France and Italy. In France these controls will be manufactured by La Société Française de Materiel d'Aviation, 58, Rue Fenelon, Montrouge (Seine), while in Italy its manufacture has been undertaken by Secomdo Mono, Somma Lombardo.

INSTRUMENT DRIVES

Commenting on a recent paragraph in *Flight* advocating the use of engine-driven pumps, instead of venturis, for instrument operation, the Sperry Gyroscope Co., Ltd., state that for a long time they have been endeavouring to convert manufacturers to this viewpoint. They add that they will be pleased to furnish particulars of air- and oil-driven pumps to aircraft or engine manufacturers; they have had considerable experience with such pumps, which are standardised on all installations where the Sperry Gyro Pilot is employed.

PUBLICATIONS RECEIVED

National Advisory Committee for Aeronautics. Report No. 494. A Flight Investigation of the Lateral Control Characteristics of Short Wide Ailerons and Various Spoilers with Different Amounts of Wing Dihedral. By F. E. Weick, H. A. Soulé and M. N. Gough. Price 10 cents.

No. 495. *A Description and Test Results of a Spark-Ignition and a Compression-Ignition 2-Stroke-Cycle Engine.* By J. A. Spanogle and E. G. Whitney. Price 10 cents.

No. 503. *The Effect of Spray Strips on the Take-off Performance of a Model of a Flying-Boat Hull.* By Starr Truscott. Price 10 cents.

No. 504. *On the Theory of Laminar Boundary Layers Involving Separation.* By Th. von Kármán and C. B. Millikan. Price 10 cents.

Twentieth Annual Report of the National Advisory Committee for Aeronautics. 1934. Price 15 cents.

U.S.A.: Superintendent of Documents, Washington, D.C.

War from the Air: Past—Present—Future. By Air Commodore L. E. O. Charlton. Price 6/- net. London: T. Nelson & Sons, Ltd.

Jaarverslag van de Nationale Luchtvaart School, N.V. 1934. (Annual report of the National Flying School). Holland: Secretariaat, Waalhaven, Rotterdam.

H.O. No. 188. *Naval Air Pilot. Alaska Peninsula, Southern and South-Eastern Alaska.* Price $1.80. U.S.A.: Hydrographic Office, Washington, D.C.

The Air Pilot of Southern Rhodesia: Volume 1.—*Southern Rhodesia and Nyasaland,* Price 12/6 net. London: High Commissioner for Southern Rhodesia, Crown House, Aldwych, W.C.

AERONAUTICAL PATENT SPECIFICATIONS

Abbreviations: Cyl. = cylinder; i.c. = internal combustion; m. = motors. (The numbers in parenthesis are those under which the specification will be printed and abridged, etc.)

APPLIED FOR IN 1933

Published April 4th, 1935.

24396. HUMPHERY, G. E. WOODS-, and MAYO, R. H. Method of ventilating compartments in aircraft. (425,110.)

24405. REID, G. H. Aircraft and other gyroscopic navigational instruments. (425,111.)

24579. STENNING, G. A. Propulsion of aircraft. (425,046.)

24970. BRISTOL AEROPLANE CO., LTD., FEDDEN, A. H. R., and BUTLER, L. F. G. Cylinders of sleeve-valve internal combustion engines and the like. (425,174.)

30251. BRISTOL AEROPLANE CO., LTD., and FEDDEN, A. H. R. Internal combustion engines having sleeve-valves. (425,060.)

Published April 11, 1935.

16464. BENDIX AVIATION CORPORATION. Indicating-instruments such as sensitive altimeters.

APPLIED FOR IN 1934

21991. SOC. D'INVENTIONS AERONAUTIQUES ET MECANIQUES S.I.A.M. System of retractable landing gear for aeroplanes. (425,207.)

26454. SCHNEIDER AND CIE, and FIEUX, J. Directional stabilising-apparatus for aerial or marine craft or navigation instruments. (425,009.)

35050. DUSSI, R. Variable-pitch propellers. (425,028.)

FLIGHT

Prepaid Advertisement Rates: 2d. per word, minimum 3/6. Series Discounts are allowed to trade advertisers as follows on order for consecutive insertions, provided a contract is placed in advance. 13 consecutive insertions, 5%; 26 consecutive, 10%; 52 consecutive, 15%. Situations Wanted ONLY 18 words, 1/6, 1½d. per word after. Box No., 6d. per insertion extra. Latest time of arrival of advertisements for these columns, **FIRST POST TUESDAY** of each week at: Dorset House, Stamford Street, London, S.E.1, or one day earlier at branch offices (addresses, see first Editorial page).

MISCELLANEOUS ADVERTISEMENTS

IMPORTANT NOTICE.

Owing to the Easter Holidays, the next issue of "FLIGHT" (April 18th) must be closed for press earlier than usual.

In accordance with the notice that appeared last week, the latest date upon which MISCELLANEOUS ADVERTISEMENTS can be accepted for the above issue is

FIRST POST, MONDAY, APRIL 15th

Aircraft and Engines For Sale

KLEMM 2-SEATER, British Salmson engine, 2 magnetos, large wheel undercarriage, 250 hours. 5 hours since top overhaul and re-paint. Very clean aircraft. £225 or near offer. Beardmore Service, Ltd., 28, Queen's Road, W.2.

FOR Sale. 40 h.p. Salmson Klemm, cruises 70. C. of A. November, 30 hrs. since top overhaul and C. of A. £225. R. Somerset, North Eastern Airways, Heston.

MILES HAWK. 12 mths. C. of A. Dual control. Wheel brakes. Best offer accepted. Box No. 1036, c/o "Flight," Dorset House, Stamford Street, London, S.E.1.

WINGS, tail, controls, fittings complete for glifder, auto-tow wheels, small amount work, complete. Efficient machine. Chambers, 16, Ellys Road, Coventry. £9 9s.

Contractors for Aerodromes

P.C.S. LTD. Painting Contractors and Decorators. Structural alterations, Heating and Sanitary Engineering, 74, Victoria Street, S.W.1. (Victoria 1031.)

OVERHEAD LIMITED. *Electrical Engineering* and Public Works Contractors. Ground Lighting, Cable Laying, Power and Installations, Aerodromes and Factories.—74, Victoria Street, S.W.1. (Victoria 1031.)

DEMOLITION & CONSTRUCTION CO., LTD. Civil Engineering, Building and Public Works Contractors—74, Victoria Street, S.W.1. (Victoria 1031.) Contractors to Messrs. De Havilland Aircraft Co., Hatfield.

Patent and Trade Mark Agents

STANLEY, POPPLEWELL & FRANCIS, Chartered Patent Agents, 88-90, Chancery Lane, London, W.C.2. Telephone: Holborn 6393. Established 1879.

A. P. THURSTON & CO., Chartered Patent Agents, 329, High Holborn, W.C.1. Tel.: Hol. 1117.

GEE & CO. Patents and Trade Marks throughout the World. (H.T.P. Gee, Mem. R.S.G.B., A.M.I.R.E., etc.), 51–52, Chancery Lane, London W.C.2 (2 doors from Govt. Patent Office). 'Phone: Holborn 1525. Handbook free.

KING'S Patent Agency Ltd. (B. T. King C.I.M.E., *Registered Patent Agents*, G.B. U.S.A., and Canada). Advice, Handbook and Consultations free. 49 years' references. 146a Queen Victoria Street, E.C.4. 'Phone: City 6161.

Official Notices

ROYAL AIR FORCE.

APPLICATIONS are invited for short service commissions (six years active list and four years reserve service) in the General Duties Branch (Flying). Candidates must have attained their 18th, but not their 22nd birthday. They must have been educated up to or beyond the School Certificate standard and must be of good physique. Apply Secretary (Dept. S.7. R), Air Ministry, Kingsway, London, W.C.2.

Consultants

R. H. STOCKEN, M.I.Ae.E., Aeronautical Consultant and Test Pilot. 18/20 Lower Regent Street, S.W.1. Whitehall 8815.

SQN. Leader R. de Haga Haig and Partners, Aeronautical Consultants, Airport, Equipment Surveys, etc., 7 Princes Street, London, S.W.1. Whitehall 3321.

REPRESENTATIVE FOR OVERSEAS

W. S. SHACKLETON, LTD., 175, Piccadilly, London, W.1. Consulting Engineers and Merchants—Expert examinations, tests, reports—Buying and shipping—Agencies arranged. WANTED: Aircraft and Engines.

Air Survey

AIR SURVEY CO., LTD. Hayes, Middlesex. Established 1924. More than 100 surveys successfully executed. Prepared to tender for surveys of every description in any part of the World. Telephone: 632 Hayes, Mdlx. India Branch, Dum Dum, Calcutta.

Inventions

DIRECTOR of aeronautical co., with capital at command, will be interested in any genuine proposition. No agents. Box 1047, c/o "Flight," Dorset House, Stamford Street, London, S.E.1.

Financial

DIRECTOR of aeronautical co., with capital at command, will be interested in any genuine proposition. No agents. Box 1046, c/o "Flight," Dorset House, Stamford Street, London, S.E.1.

AIRCRAFT Pioneer requires finance to build competition machine and establish manufacturing. Excellent prospects and position. Box 1043, c/o "Flight," Dorset House, Stamford Street, London, S.E.1.

Books

THE AIRSHIP, No. 5, 1s. quarterly, now on sale. Contains information unobtainable elsewhere. Apply any bookstall or The Publishers 18, Hugh Mews, High Street, S.W.1.

The Wireless World — Every Friday 4d.

Situations Vacant

SEVERAL first-class senior aircraft draughtsmen required immediately. Good salary to right man. Apply by letter, stating age, experience and salary required, to The Fairey Aviation Co., Ltd., Hayes, Middlesex.

EXPERIENCED Leading Draughtsmen and Designers required for South England. High Speed I.C. engine experience essential. Full experience, age and salary required to B., Box No. 4741, c/o "Flight," Dorset House, Stamford Street, London, S.E.1.

AIRCRAFT WOODWORKERS required: experienced men only. Percival Aircraft Co., Gravesend Aerodrome, Gravesend.

EXPERIENCED Stressman required immediately. Apply stating age, experience and salary required, to Box No. 8736, c/o "Flight," Dorset House, Stamford Street, London, S.E.1.

SHEET metal workers, aircraft experience preferred but not essential. Percival Aircraft Co., Gravesend Aerodrome.

REQUIRED, senior stressmen and aircraft draughtsmen. Write, stating age, experience and salary required, Hawker Aircraft, Ltd., Kingston-on-Thames.

REQUIRED immediately, a number of erection insepectors and viewers. Apply giving age and experience to Boulton Paul Aircraft Ltd., Norwich. Mark envelopes I/D.

SENIOR and Junior aircraft Draughtsmen required for London area. Apply, stating age, experience and salary required, to Box No. 8744, c/o "Flight," Dorset House, Stamford Street, London, S.E.1.

Situations Wanted

PARACHUTIST (two years' experience aircraft work) requires post as jumper and mechanic with joy riding concern for all-round experience. Small wage required. Box No. 1032, c/o "Flight," Dorset House, Stamford Street London, S.E.1.

ADVERTISER at present employed in an executive position by a well-known firm of aircraft constructors, seeks change of situation, as Assistant Works or Production Manager. Twenty years' experience of all metal construction, experimental and production types, jig and tool design and general works organisation. Box 1035, c/o "Flight," Dorset House, Stamford Street, London, S.E.1.

STEWARD, age 37, 20 years' experience, seeks situation Club or Canteen management, experience catering and buying. Cartwright, 15, Alwyne Road, Canonbury, London.

DESIGNER-DRAUGHTSMAN, 11 years drawing office experience, motor cycle engines, special purpose machines, jigs, tools. 4½ years Mechanical Superintendent light presswork. Disengaged. Box. 1039, c/o "Flight," Dorset House. Stamford Street, London, S.E.1.

YOUNG MAN, 27 years, "B" pilot's licence, 1,250 hours commercial flying, tropical countries, high altitudes, also "A" and "C" ground engineer's licences, open for engagement. Flying experience includes pleasure, instruction, mail, charter; engineering includes overhauls for C. of A. Also managerial experience. Administrative capacity preferred. Go anywhere. Apply Box 8743, c/o "Flight," Dorset House, Stamford Street, London, S.E.1.

GROUND Engineer requires situation, go anywhere, "A" and "C" licences. Moths, Avians, Spartans, Cirrus and Gipsy engines. Box 1037, c/o "Flight," Dorset House, Stamford Street, London, S.E.1.

MAN with 7 years experience supervision, tools and details, seeks similar position. Box 1040, c/o "Flight," Dorset House, Stamford Street, London, S.E.1.

YOUNG man, 18, seeks situation. Will do anything connected with aviation. Very keen. Good knowledge. B. A. Jacobs, 77, Woodberry Grove, London, N.4.

EX-MERCANTILE Marine steward (30 years) experience, as steward of small aero club or any post in large that would lead to same. Leach, 63, Ruskin Avenue, E.12.

YOUNG man, 18, keen on joining air circus. Drive car, go anywhere. Knowledge aviation. Kingshott, 35, Southcote Ave., Feltham.

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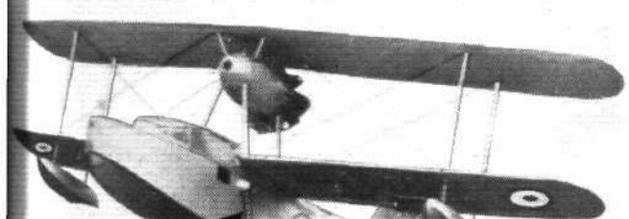

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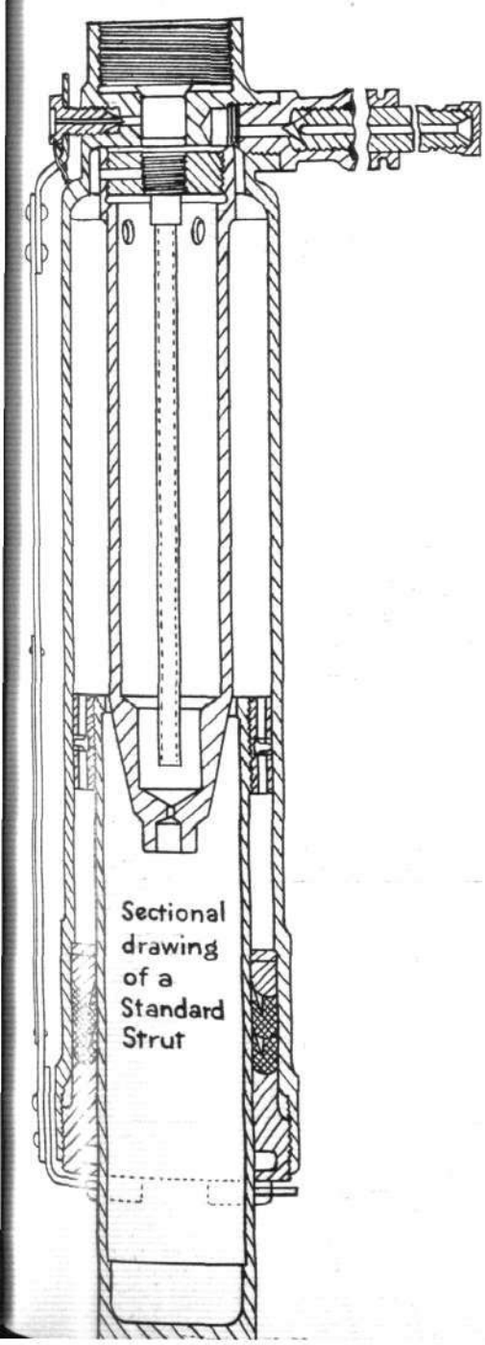

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